MODERN
HOME LAUNDRYWORK

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by

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A good book. Serves for the ~~[illegible]~~ instruction
... necessary things in the modern
world.

FOREWORD

THE book on Modern Home Laundrywork for which I have been asked to write a Foreword meets a need which has for some time been recognized by those concerned with the teaching of the mechanics of living.

The housewife who desires to use labour-saving intelligent methods in order to carry out easily and successfully the lighter portions at any rate of the laundrywork of her household; the schoolgirl whose School Certificate syllabus includes a basis of instruction for that purpose; and the Training College student making a more comprehensive study, all need a handbook such as this.

Instruction in every process of laundrywork is included, concisely set out and easily to be identified in the index. At the same time the basis on which the treatment is recommended is shown with equal clearness in the chapters on the composition of materials, cleansing agents and their chemical composition, etc. Apparatus operated by hand, electricity, and gas, is also dealt with, in the scientific manner which is also practical; and the chapter on simple experimental work will be of much value.

The book will, I am sure, earn the grateful appreciation of those for whom it is written.

R. WHITAKER.

Principal. Gloucestershire Training College of Domestic Science.

ERRATA

Page 15, line 2. *Read*:

$$Ca(OH)_2 + CaCO_3H_2CO_3 \rightarrow 2CaCO_3 + 2H_2O$$

Page 21, *Hydrolysis*. *Read*:

$$\begin{array}{llllll}
\left(\begin{array}{l} CH_2 \\ CH \\ CH_2 \end{array}\right. & \begin{array}{l} OOC.C_{17}H_{35} \\ OOC.C_{17}H_{35} \\ OOC.C_{17}H_{35} \end{array} & \begin{array}{c} \\ + \\ \end{array} & \begin{array}{l} HOH \\ HOH \\ HOH \end{array} & \begin{array}{c} \\ \rightarrow \\ \end{array} & \begin{array}{l} CH_2OH \\ CH\ OH \\ CH_2OH \end{array} + 3C_{17}H_{35}COOH \\
\text{stearin} & & & \text{water} & & \text{glycerine} \quad \text{stearic acid}
\end{array}$$

Page 21, *Saponification*. *Read*:

$$\begin{array}{llllll}
\left(\begin{array}{l} CH_2 \\ CH \\ CH_2 \end{array}\right. & \begin{array}{l} OOC.C_{17}H_{35} \\ OOC.C_{17}H_{35} \\ OOC.C_{17}H_{35} \end{array} & \begin{array}{c} \\ + \\ \end{array} & \begin{array}{l} NaOH \\ NaOH \\ NaOH \end{array} & \begin{array}{c} \\ \rightarrow 3C_{17}H_{35}COONa + \\ \end{array} & \begin{array}{l} CH_2OH \\ CH\ OH \\ CH_2OH \end{array} \\
\text{stearin} & & & \text{caustic soda} & \text{sodium stearate} & \text{glycerine} \\
\text{fat} & & & \text{alkali} & \text{soap} &
\end{array}$$

Page 36, line 15. *Read*:

$$Ca(OCl)Cl + Na_2CO_3 \rightarrow CaCO_3 + NaCl + NaOCl$$

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CHAPTER I

PROPERTIES AND REACTIONS OF TEXTILE FIBRES

MODERN fabrics of infinite variety are available for the housewife of to-day. This wide selection is due to the larger number of textile fibres in use, the extensive range of reliable colours, the beautiful and varied effects produced by weave, surface finish, and the combination of different fibres. This choice is open to everyone owing to the low cost of the finished materials.

Many factors make home laundrywork practicable to-day, and the most important is the ease with which all modern fabrics can be treated satisfactorily by the housewife. It is essential that the properties and reactions of the textile fibres should be understood if satisfactory results are to be obtained. Otherwise irreparable damage may be done to the materials under treatment.

The thin fibres of textiles are twisted together to form threads or yarns which are woven or knitted into the various fabrics. These fibres may be divided into the following classes:

Animal fibres:	(1) Wool, hair.	(2) Silk.	
Vegetable fibres:	(1) Cotton.	(2) Linen.	(3) Ramie.
Artificial fibres or filaments:	(1) Viscose.	(2) Cellulose Acetate.	
	(3) Cuprammonium.	(4) Chardonnet.	

Animal fibres are obtained from living animal organisms, such as the sheep and the silkworm. The vegetable fibres are parts of plants; the stem in the case of linen and ramie, and seed hairs in cotton. Vegetable matter also forms the basis for artificial fibres or filaments, all of which are made from cellulose.

Wool:

Origin. Wool was one of the first fibres to be made into materials because, being curly it was easy to spin. Wool is obtained from the sheep, but hair from the camel, goat, and rabbit is also used in making fabrics.

B

Composition. The woollen fibre has a complicated chemical structure. It contains a protein keratin which has the formula $C_{43}H_{71}O_{13}N_{13}S$, and is the only textile fibre containing sulphur. Cholesterol is present in the wool grease from which lanoline is made.

Preparation. Sheep shearing is followed by the cleaning of the fleece. The dirt present consists of vegetable matter, mineral dirt, grease, and dried perspiration. Dusting and carbonizing remove the vegetable and mineral matter. The other dirt is removed by scouring the wool in soapy alkaline solutions and rinsing, or the grease may be removed by a grease solvent before the wool is washed. The wool is kept soft and elastic by drying to the humidity of the atmosphere and by oiling. After these processes the wool is smoothed, drawn out, and twisted into yarns. Loosely twisted fluffy yarn is made into soft woollen materials and knitted goods, and the smoother tightly twisted yarn is used for weaving worsteds. Bleaching is usually necessary for undyed woollens owing to the yellow colour produced by the scouring process. The cheapest method is to treat the moist wool with sulphur dioxide gas, but even after rinsing some sulphurous acid remains in the wool. A more lasting method of bleaching is obtained by using hydrogen peroxide solution, but this is more expensive.

Structure of the fibre. The outside of the wool fibre is covered with overlapping scales which give a serrated appearance to the edge. The inner part consists of a central canal surrounded by spindle-shaped cells, which give strength and elasticity to the fibre.

Felting and shrinking. Heat, moisture, and alkalis soften the walls of the fibre, and cause the scales to spread outwards. If pressure, friction, or change of temperature occurs while the fibres are in this softened state the scales on adjacent fibres will interlock, causing permanent shrinking and felting of the fabric.

Chlorination. Wool is sometimes treated in manufacture with a weak solution of hypochlorous acid. In this case the wool absorbs chlorine and the fibres are smoothed owing to the flattening and partial removal of the scales. This treatment reduces the tendency to shrinkage and felting during the laundering processes.

Absorption. Wool is hygroscopic and retains moisture even when apparently dry; 12–14 per cent of moisture is usually present in the finished materials. This fact of water absorption is important in connection with the use of wool for under and outer garments. With

the moisture absorbed the fibres take up dirt and grease, so that wool worn next to the skin needs frequent washing. Any impurities in water will be taken up by the wool, so it is important to use soft or softened water for the washing and rinsing processes, as calcium salts tend to make the wool hard. Soap is difficult to remove from the wool fibres, so efficient rinsing is essential. Soap left in woollen fabrics causes an unpleasant smell, and is responsible for yellowness in white wool after several washings.

Effect of heat. Wool chars or scorches easily. This is partly due to the hairy surface. The fibre smoulders, does not burn readily, and gives a smell of burnt feathers typical of burning protein. The ash remains as a black ball.

Conduction. Wool conducts heat slowly. The air entangled between the fibres acts as a non-conductor of heat.

Action of alkalis. Alkalis tend to make wool yellow, hard, and felted instead of soft and elastic. Hot alkaline solutions will be more harmful as the fibres become gelatinous and easily harmed by slight friction. Borax and ammonia have no harmful effect on wool, and these may be used for steeping new woollens, which possess slight natural acidity, and in order to neutralize any sulphurous acid which may be retained from the bleaching process.

Action of acids. Dilute acids have little effect on wool, but hot concentrated solutions may weaken the fibres or dissolve them.

Dyeing. Wool dyes readily with most types of dyes. The fact that it absorbs acids readily, helps in dyeing wool for the manufacture of coloured woollen fabrics.

Bleaches. All mild oxidizing bleaches may be used. Hypochlorite bleach must never be used on wool as it discolours and destroys the fibres. Reducing bleaches may also be used with safety.

Silk:

Origin. This fibre is known to have been used in China in 2000 B.C. It is a secretion of *Bombyx mori*, the cultivated silkworm, and certain wild silkworms, and forms the thread used by the larva to make the pupal case.

Composition. Two glands in the head of the larva send out a viscous fluid called fibroin. This issues through a single outlet, and two other glands send out a gummy liquid sericin from the same outlet. These secretions set or coagulate on emergence into the air, and thus the raw

silk thread is composed of a double filament of fibroin surrounded by sericin or silk gum. These materials are of a protein nature, but of less complicated structure than the protein in wool, and no sulphur is present. Raw silk contains 75 per cent fibroin and 25 per cent sericin.

Preparation. The cocoons composed of the silk thread are first placed in warm water and the softened filament unwound, several filaments being collected together to form a thread. These threads may be over 500 yards in length. The shorter lengths are spun into threads. Degumming by boiling the silk in weak soap solution is the next process, and leaves a fine single lustrous filament. Silk is bleached by treating with hydrogen peroxide or sulphur dioxide. It is more difficult to remove all the gum from wild silk, so the finished fibre has slightly different properties from cultivated silk owing to the fact that gum is still present.

Structure of the fibre. The degummed silk fibre is smooth, cylindrical, and very fine. Wild silk is made up of broader fibres, which have longitudinal markings.

Effect of moisture. Silk absorbs moisture and generally contains about 11 per cent moisture. The fibre does not stretch or spoil in water, and is not affected by changes of temperature. A cold rinse will stiffen silk slightly, and a small quantity of acetic acid in the final rinsing water will improve the 'scroop' of the silk.

Absorption. Silk absorbs some metallic salts, and organic acids, such as tannic acid, and these help to add weight and covering power to the silk. Tin chloride and iron tannate are two common weighting materials. These are absorbed, causing the fibres to swell. They are not removed by washing the silk, but may damage the fibre by causing it to crack at folds and rot when acted upon by perspiration or sunshine.

Dyeing. Salts used for weighting also act as mordants, making the silk dye more readily. Silk fibres dye well, but not as readily as wool fibres.

Effect of heat. Excessive heat discolours white silk and weakens weighted silk. Silk chars or scorches easily, and like wool burns, giving the characteristic smell of burning protein; the ash forms a black, easily crushed ball. Weighted silk burns slowly, and the ash retains the shape of the silk burnt.

Effect of friction. Friction or pressure may damage the fine fibres.

Action of alkalis. Dilute alkalis discolour and tender the silk,

although they are less harmful to silk than to wool. Avoid the use of alkalis and rinse thoroughly after washing to remove all soap. Hot concentrated alkalis dissolve silk.

Action of acids. Strong acids dissolve silk more readily than wool. Weak organic acids are absorbed. Thus there is a possibility that acetic acid used in the rinsing water may be retained by the silk, and this will react with the soap during the next washing process, causing fatty acids to form marks on the fabric.

$$\underset{\text{acetic acid}}{CH_3COOH} + \underset{\text{sodium stearate}}{C_{17}H_{35}COONa} \rightarrow \underset{\text{sodium acetate}}{CH_3COONa} + \underset{\text{stearic acid}}{C_{17}H_{35}COOH}$$

Steeping silk in borax solution before washing removes the risk of this happening.

Wild silks are more resistant to the action of acids and alkalis.

Action of bleaches. Hypochlorite bleach must never be used, or the fibre will become yellow and rotted. Other oxidizing bleaches may be used in weak solutions, and a reducing bleach is not harmful.

Cotton:

Origin. The cotton fibre has not been in use as long as silk or wool. It is known to have been used for making fine materials in India before 500 B.C. The fibre comes from the fruit of the cotton plant, which grows in tropical America, the West Indies, Egypt, India, and China. When the cotton boll bursts it exposes a dense mass of white fibres covering the cotton seeds.

Composition. Cotton consists chiefly of a pure form of cellulose. It contains carbon, hydrogen, and oxygen in the proportion of $C_6H_{10}O_5$, but the size of the molecule is not known.

Preparation. The fibres are first removed from the seeds, which are used for the production of cottonseed oil. The rest of the treatment applied to the cotton fibre is carried out in a cool, moist atmosphere, as this makes the fibre stronger to handle. The processes include cleansing by mechanical means; carding, in which the fibres are smoothed and drawn together to form a loose rope or sliver; combing, to smooth the sliver; and then drawing out the sliver into a fine thread and twisting it in the spinning machines to form cotton yarn. Various finishes are applied to the yarn or to the woven fabric in order to produce the different effects. Loading or dressing is often used to improve the appearance of the material. Starches and gums are used, but these are removed in washing.

Structure of the fibre. The cotton fibre when growing forms a tube containing sap. When this sap dries up the tube collapses and the fibre becomes like a flat twisted ribbon. The length of the fibre varies according to the plant on which it grows. Sea Island cotton has the longest and finest fibres, then comes Egyptian cotton, American cotton, and lastly the East Indian cotton, which has coarser shorter fibres, but is very strong.

Effect of moisture. Cotton is a strong fibre not harmed by moisture. The fibre retains its strength while wet. It can stand friction and high temperatures, so that it may be washed in the way most suitable to remove the dirt.

Shrinking. Shrinking may occur during washing, due to the material having been stretched in the finishing processes of manufacture. One of the latest developments of the textile industry has been the introduction of a mechanical shrinking process which causes the fabric to regain the size at which it left the loom, so that in future cotton fabrics should not present the unwelcome property of shrinking.

Effect of heat. At high temperatures the cotton will char and fall into holes. It burns readily, owing to the nature of the fibre and the slightly hairy surface of the thread. It leaves a fine grey ash. Cotton fabrics, excepting flannelette, conduct heat readily, and are cool to wear. The surface of the fabric is made fluffy in flannelette by raising tiny threads. Air held between these helps to prevent the conduction of heat, but it makes the fabric more inflammable than ordinary cotton.

Absorption. Cotton does not hold moisture as well as wool or silk, and soon feels damp. The tiny threads on the surface of the cotton take up water by capillary action, and this spreads rapidly through the material, which soon becomes saturated.

Dyeing. Cotton does not dye as readily as wool or silk, and often a mordant is used to act as a link between the dye and the fabric, e.g. salt used in home dyeing.

Action of alkalis. Alkaline solutions have little effect on cotton, so that a slight amount of alkali in the washing water is not harmful to the fibre, but will affect the colour of dyed cottons. Concentrated solutions of caustic soda applied under tension will cause the cotton fibre to become smooth and cylindrical, giving a silky or mercerized effect, due to the reflection of light from the smooth fibre. Mercerized cotton will dye more readily than the untreated material.

Action of acids. Strong concentrated acids destroy the fibre. Dilute solutions have little effect unless allowed to dry on the fabric, when they will become concentrated and cause rotting. Thorough rinsing is important after using acids for stain removal.

Bleaching. All oxidizing bleaches, including hypochlorites, may be used on bleached cotton, but concentrated solutions of hypochlorites cause tendering, especially when the fabric is afterwards treated in a hot alkaline solution. Reducing bleaches may also be used, but efficient rinsing is necessary to ensure the removal of all traces of acid from the fabric.

Linen:

Origin. Linen as a textile fibre has been in use probably as long as wool. It is a bast fibre that is made from the stem of the flax plant, which is grown in moist temperate climates.

Composition. It is composed chiefly of cellulose and only differs from cotton in its physical properties.

Preparation. The flax is grown closely to prevent the stems from branching. After pulling, the seeds are removed and used to extract linseed oil. The stems are then retted so that the fleshy part of the stem is rotted and removed. The woody outer portions are removed by scutching and hackling. The fibres vary in length from ten inches to several feet. These are spun, and as only slight twisting is necessary a glossier thread is produced than in the case of cotton. After weaving the fabric is bleached in most cases. Hypochlorites are first used, then the better quality linens are finally bleached by exposing the moist fabric to sun and air, as this gives a better whiteness to the surface. Dressing may be added to the cheaper varieties of fabric, but the effect is lost after washing.

Structure of fibre. The linen fibre is made up of bundles of cells of varying length. Transverse markings at intervals give the fibre a resemblance to bamboo.

The properties of linen are similar to those of cotton. It can be washed by friction in hot water, and can be boiled. The action of heat and alkalis is also similar. It is more resistant to the action of acids. Linen differs from cotton in the fact that it has a glossier surface, absorbs moisture more rapidly, and is a better conductor of heat.

Ramie. This fibre is also a bast fibre, consisting chiefly of cellulose, and comes from two species of nettle which are grown in India and

China. The Chinese variety is often known as China-grass. It is prepared differently from linen, as the gum has to be removed, and the ramie fibre would be disintegrated by the methods applied to linen. The finished fibre is fine and silky, so that it is suitable for weaving into fine table linen. A slight amount of gum in the fabric makes starching unnecessary, as the material will stiffen sufficiently if ironed damp.

Structure of the fibre. The fibre is made up of cells about 1 inch in length, and the whole fibre has longitudinal marking. It is fine, silky, and strong.

Rayons:

Origin. These were first known as artificial silks, as the main object in developing a new fibre was to provide a cheap substitute for silk. Although rayon fibres have a lustrous appearance, and many rayon fabrics closely resemble silk, all rayons are really of vegetable origin, as cellulose is used for the starting-point in their manufacture. The cellulose is brought into solution by various methods, and from these liquids smooth structureless fibres are produced which reflect light, so giving a lustrous appearance.

Methods of Manufacture:

(1) *The nitrocellulose method* was the first used to produce rayon fabrics. This was patented by Count Chardonnet in 1886, but Sir Joseph Swan had previously used this fibre in his electric light bulb filaments.

Nitrocellulose is produced by treating cotton with a mixture of concentrated sulphuric and nitric acids. The inflammable material thus produced is dissolved in alcohol and ether, the solution then being forced through tiny holes, either into the air, so that the solvent evaporates leaving a fine filament, or into a coagulating bath of salt solution or water. The filaments are then denitrated and rendered non-inflammable by treatment with sodium or ammonium sulphide. This process is little used to-day owing to the expense.

(2) *The cuprammonium process* was based on a discovery by Schweitzer, but was developed by Pauly in 1897.

In this method cotton linters are dissolved in an ammoniacal solution of cupric oxide. The solution is forced through fine jets into caustic soda solution, a regenerated cellulose filament being formed. The copper is removed by washing the fibres in dilute sulphuric acid.

This fibre can be stretched while wet, so that very fine filaments are formed; thus cuprammonium rayon closely resembles silk.

(3) *The viscose method* is the one that is used to produce the largest proportion of rayon at the present time. Cross and Bevan patented 'viscose' in 1892, and further improvements in the process were discovered by Topham and Stern.

Wood pulp or cotton is treated with caustic soda to form an alkali cellulose. This is mixed with carbon bisulphide to form cellulose xanthate, which is soluble in water. This forms a reddish gelatinous solution called viscose, and after 'ageing' it is forced through nozzles into a coagulating liquid consisting of sulphuric acid and sodium sulphate. Many of the fine filaments are drawn together to form the rayon threads.

(4) *The cellulose acetate method* has been developed commercially since 1918, although the actual process was discovered as early as 1894.

This process differs from all the others because, instead of being brought into solution and then regenerated by passing into a coagulating medium, the cellulose is acted upon by acetic anhydride and acetic acid in the presence of a catalyst such as sulphuric acid, and cellulose acetate is produced. The hydrogen of the acetic acid is replaced by the cellulose molecule with the formation of water. Thus one form of cellulose acetate may be represented:

$$\underset{\text{acetic acid}}{CH_3COO(H)} \qquad \underset{\text{cellulose}}{(C_6H_{10}O_5)}$$

$$\underset{\text{cellulose acetate}}{CH_3COOC_6H_9O_5}$$

This cellulose acetate is allowed to ripen, and then is dissolved in acetone.

The solution is passed through fine holes into hot air, so that the solvent evaporates, leaving a filament of cellulose acetate.

Properties of Rayons. Owing to the method of formation of the rayon filaments the fabrics made from them differ from the other cellulose fabrics.

Effect of Moisture. Rayons lose strength when wetted, and the viscose rayon loses more than the cellulose acetate rayon. Therefore rayon fabrics require careful handling during laundering processes. The fibres will stretch out of shape easily if pulled or twisted whilst wet, or if allowed to drop during drying. Pressure on the wet fibres may cause holes.

Effect of heat. Viscose rayon may be glazed and the fibre damaged by excess heat. Delustred rayon has been treated specially so that the fibres do not reflect light. It is difficult to retain this dull finish after washing, as heat and moisture will bring back the lustre. Cellulose acetate rayon melts when treated with too hot an iron, so that the heat of the iron must be regulated carefully when pressing or ironing this fabric.

Burning. Viscose rayon burns rapidly like ordinary cellulose, leaving a grey ash, and giving no smell. Cellulose acetate melts, forms a hard black ball after burning, and gives a smell of acetic acid.

Action of acids. Cellulose acetate dissolves in glacial acetic acid, and all rayons are weakened by dilute solutions of strong acids.

Grease solvents. Acetone must never be used on cellulose acetate, as it will dissolve.

Action of alkalis. Alkalis tend to weaken and discolour the fibres, so these should be avoided.

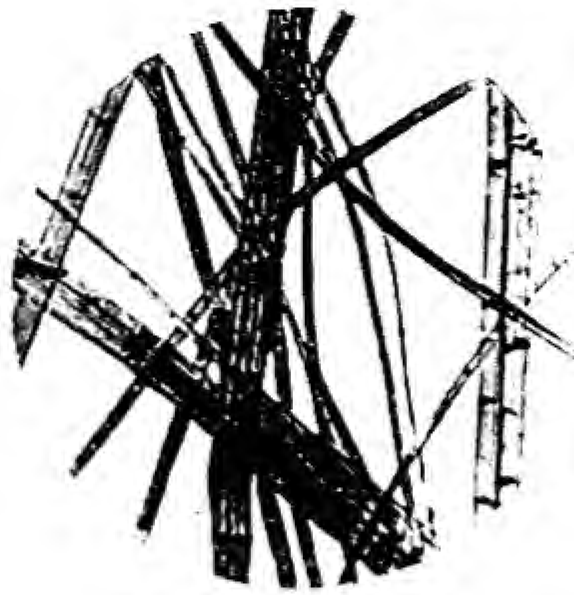
Action of bleaches. Oxidizing bleaches may be used with great care, and reducing bleaches, if the solution is not too hot. Strong hypochlorite solutions weaken the fibres. Owing to the smoothness of the rayon fibres stains and dirt are not held readily, and drastic treatment should not be necessary.

It is often difficult for the housewife to distinguish between the types of rayon, and it is safest in laundry treatment to use precautions at each stage so as to protect the most easily damaged type of fibre. Thus avoid excessive heat during washing, drying, and finishing. Avoid pressure or strain on the wet fibres, and select the finishing process to retain the original surface effect.

Many fabrics are composed of a mixture of textile fibres, and all cleansing treatments applied must be suitable for all the fibres present.

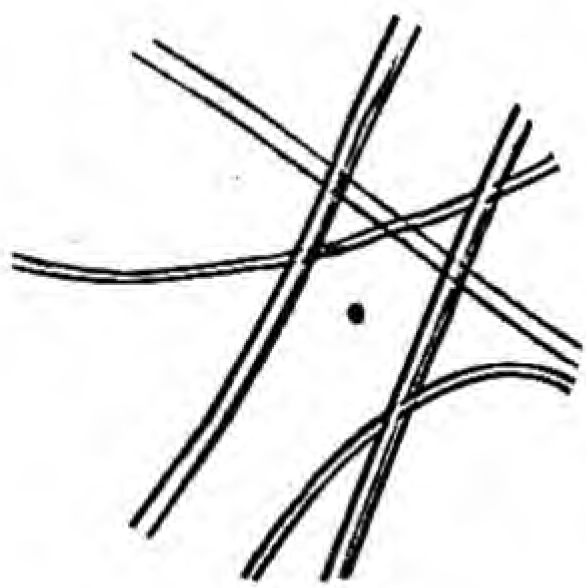
In order to discover the composition of a fabric the quickest method is to burn a piece of it, or some threads if a mixture. This will help to show whether the fibres present are animal fibres, cellulose fibres, or cellulose acetate.

Cotton × 100



Flax × 50

Wool × 30

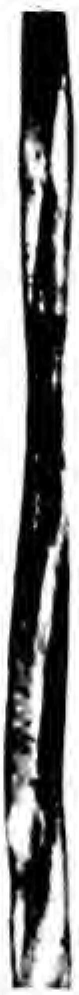


Silk × 100

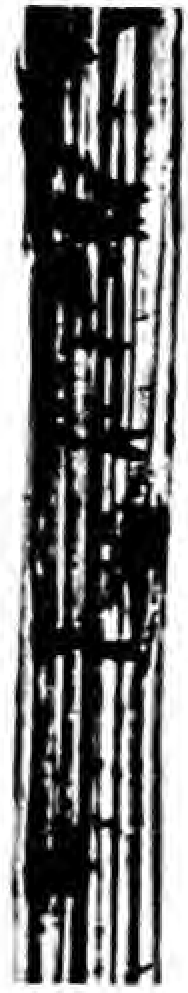
Viscose Rayon × 50

Cellulose Acetate Rayon × 100

MICROPHOTOGRAPHS OF TEXTILE FIBRES

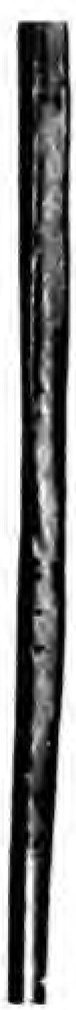


Cotton



Flax

Wool



Silk

Viscose Rayon

Cellulose Acetate Rayon

MICROPHOTOGRAPHS OF TEXTILE FIBRES
This shows comparative size of fibres
Magnification 200

CHAPTER II

WATER

WATER plays an important part in laundrywork. It is a chemical compound containing two volumes of hydrogen to one volume of oxygen, but it is rarely found in the pure state. Although plentiful supplies are generally available in this country, all are not equally suitable for laundry purposes, and it is necessary to consider which supplies are best and how to remedy any defects.

There is a continuous cycle of water in nature. Evaporation takes place from seas and large stretches of water by the heat of the sun. The vapour-laden air is lighter than dry air; it rises and is cooled in the upper layers of the atmosphere. The cool air holds less moisture, so condensation takes place and clouds form. On contact with hills the clouds give up their moisture and rain falls. As the rain falls through the air it dissolves gases and collects particles of dust.

On reaching the earth the water flows along and collects in rivers and lakes, or it may percolate through the soil until it reaches a layer of impervious rock. Here it collects and may be tapped by a well or find a natural outlet as a spring. Nearly all water returns eventually to the sea, and thus the cycle of changes is completed.

The composition of the water supply will depend upon the nature of the ground over or through which it has passed before being collected. Some of the mineral matter will dissolve in the water, and its presence may be disadvantageous in laundrywork.

Rain water contains no dissolved mineral matter, and for this reason is most suitable for laundrywork. In districts where the water supply is hard it is most practical to collect and store rain water. This should be carried by a pipe to within easy reach of the laundry apparatus.

Hard water. Most natural waters, and especially those from chalky districts, contain calcium and magnesium salts in solution, usually as sulphates or bicarbonates. These cause hardness. They react with

soap to form insoluble calcium or magnesium soaps, and no lather is made in the water until all the hardness has been acted upon by the soap. These insoluble soaps lie on the water as scum, and in contact with fabrics may cause discoloration or tendering.

$$\underset{\text{calcium sulphate hardness}}{CaSO_4} + \underset{\text{soap}}{{}_2C_{17}H_{35}COONa} \rightarrow Na_2SO_4 + \underset{\text{calcium soap scum}}{(C_{17}H_{35}COO)_2Ca}$$

$$\underset{\text{calcium bicarbonate hardness}}{CaCO_3H_2CO_3} + \underset{\text{soap}}{{}_2C_{17}H_{35}COONa} \rightarrow {}_2NaHCO_3 + \underset{\text{calcium soap scum}}{(C_{17}H_{35}COO)_2Ca}$$

The object in preparing water for laundrywork is to remove a large amount of the hardness, and for this purpose it is better to know whether the hardness is due chiefly to the presence of bicarbonates or sulphates.

Temporary hardness is caused by calcium or magnesium bicarbonates in solution, and is the result of water containing carbon dioxide dissolved in it coming in contact with calcium and magnesium carbonates in the ground. The carbon dioxide is collected from the air and from the soil so that the water is really a weak solution of carbonic acid.

$$\underset{\text{calcium carbonate in the ground}}{CaCO_3+CO_2+H_2O} \rightarrow \underset{\text{calcium bicarbonate in solution}}{CaCO_3H_2CO_3}$$

On boiling the carbon dioxide is driven off and the insoluble calcium carbonate is precipitated. This forms 'fur' on boilers and kettles, and coats the inside of hot-water pipes. Magnesium carbonate is slightly soluble, so that boiling is not sufficient to remove all the hardness due to magnesium bicarbonate. The addition of lime or sodium hydroxide will cause the formation of an insoluble compound ($MgCO_3Mg(OH)_2$), a basic carbonate of magnesium, and this is precipitated.

Other methods of removing temporary hardness all depend upon removing the carbon dioxide from the bicarbonate and precipitating the insoluble carbonate. Lime, caustic soda, or sodium carbonate may be used.

1. *Lime or slaked lime.*

$Ca(OH)_2$ +	$CaCO_3H_2CO_3$ →	$2CaCO_3$ + $2H_2O$
slaked lime	calcium bicarbonate	calcium carbonate

If excess slaked lime is used this causes hardness.

2. *Caustic soda.*

$CaCO_3H_2CO_3$ +	$NaOH$ →	$CaCO_3$ +	$NaHCO_3$ +	H_2O
calcium bicarbonate	caustic soda	calcium carbonate	sodium bicarbonate	

Care is needed to avoid excess of caustic soda, as this is a strong alkali that would be harmful to fabrics.

These two methods are not suitable for a housewife to use, but are possible for institutional work.

3. *Sodium carbonate.*

$CaCO_3H_2CO_3$ +	Na_2CO_3 →	$CaCO_3$ +	$_2NaHCO_3$
calcium bicarbonate hardness	sodium carbonate	calcium carbonate	sodium bicarbonate

In methods (2) and (3) the water will be made slightly alkaline, owing to the presence of sodium bicarbonate, but sodium salts do not interfere with the lathering property of soap.

Permanent hardness is caused by other calcium and magnesium salts in solution chiefly as sulphates and chlorides. These cannot be removed by boiling. The softening of this water depends upon a chemical exchange. e.g.:

Na_2CO_3 +	$CaSO_4$ →	$CaCO_3$ +	Na_2SO_4
sodium carbonate	calcium sulphate hardness	calcium carbonate insoluble	sodium sulphate

The calcium sulphate causing hardness is acted upon by the sodium carbonate, and an exchange takes place so that calcium carbonate and sodium sulphate are formed. The insoluble calcium carbonate is precipitated, and the sodium sulphate left in the water is not detrimental in laundrywork. Thus sodium carbonate softens both temporary and permanent hardness, and as long as it is not used to excess this constitutes the cheapest and most practical method of water softening to the housewife. The soda should be added to the water

and allowed to dissolve, and so interact with the hardness, then sufficient soap should be added to form a lather.

Amount of hardness. For laundry purposes the hardness of water is measured in degrees. One degree (1°) of hardness means that the water contains calcium or magnesium salts equivalent to one grain of calcium carbonate in each gallon of water. Each grain of calcium carbonate present in the water requires approximately ten grains of laundry soap to counteract it.

The number of degrees of hardness in water varies with its mineral content. Water containing less than 4° of hardness is known as soft water.

Calculation of soap needed for softening water with 20° of Hardness.

$$1 \text{ oz.} \equiv 450 \text{ grains approx.}$$

$\therefore$ if water contains 20° of hardness 1 gallon contains $\equiv$ 20 grains of $CaCO_3$. 20 grains of $CaCO_3$ will require 20×10 grains of soap for softening.

$\therefore$ if 100 gallons of this water were used for laundrywork it would require $20 \times 10 \times 100$ grains of soap, or $\frac{20000}{450}$ oz. $= 2\frac{3}{4}$ lb. Cost 1s. 2d. approximately.

The whole of this soap would be used for softening the water only, and further soap would be needed before a cleansing lather could be made.

Also the scum of calcium stearate formed when softening with soap alone has to be considered.

Amount of sodium carbonate required for softening 20° of hardness. If sodium carbonate is used for softening water each grain of calcium carbonate will require about two grains of soda.

$\therefore$ in the water containing 20° of hardness, when 100 gallons of water are used, $20 \times 2 \times 100$ grains soda are required $= \frac{4000}{450}$ oz. $= 9$ oz. sodium carbonate (washing soda). Cost ½d. approximately.

Softening of temporary and permanent hardness. Most waters contain both temporary and permanent hardness, and the methods employed in softening will aim at removing all the hardness without leaving the water alkaline. The housewife will use soda, ammonia, or borax as softening agents. For large scale softening, lime and soda, or caustic soda and sodium carbonate may be used. Most laundries where the water is very hard now use a 'zeolite' water-softening plant.

Such plant is now obtainable in sizes suitable for use in the home, and the water is softened with little trouble on the part of the housewife.

Other methods of softening water are being introduced which avoid the installation of a special apparatus. The softening agent is placed in the household water cistern and softens the water as it passes through. The softening agent needs to be renewed periodically.

Sodium carbonate. The use of soda for softening has already been mentioned. The sodium bicarbonate formed as a result of softening the temporary hardness will help to remove the permanent hardness.

Borax. Borax if left in the water does not harm fabrics, but it is useful only for softening waters containing over 20° of hardness.

Lime and sodium carbonate. In the *lime and soda process* sufficient lime is added to remove the temporary hardness and sufficient sodium carbonate to remove the permanent hardness. This is a satisfactory method to employ if the water contains iron, as the iron will be carried down with the deposit as iron oxide.

Caustic soda. *Caustic soda* alone may be employed when the two kinds of hardness are present to the same extent, as the sodium carbonate formed with the temporary hardness will be sufficient to remove the permanent hardness.

Lime and caustic soda. When there is more temporary than permanent hardness the caustic soda is added to act on the permanent and temporary hardness, and then lime is added equivalent to the excess of the temporary hardness.

Caustic soda and sodium carbonate. When there is excess of permanent hardness caustic soda may be added equivalent to the temporary hardness and sodium carbonate equivalent to the excess of permanent hardness.

Base exchange process. The base exchange process is the most popular and generally satisfactory method of water-softening used at present.

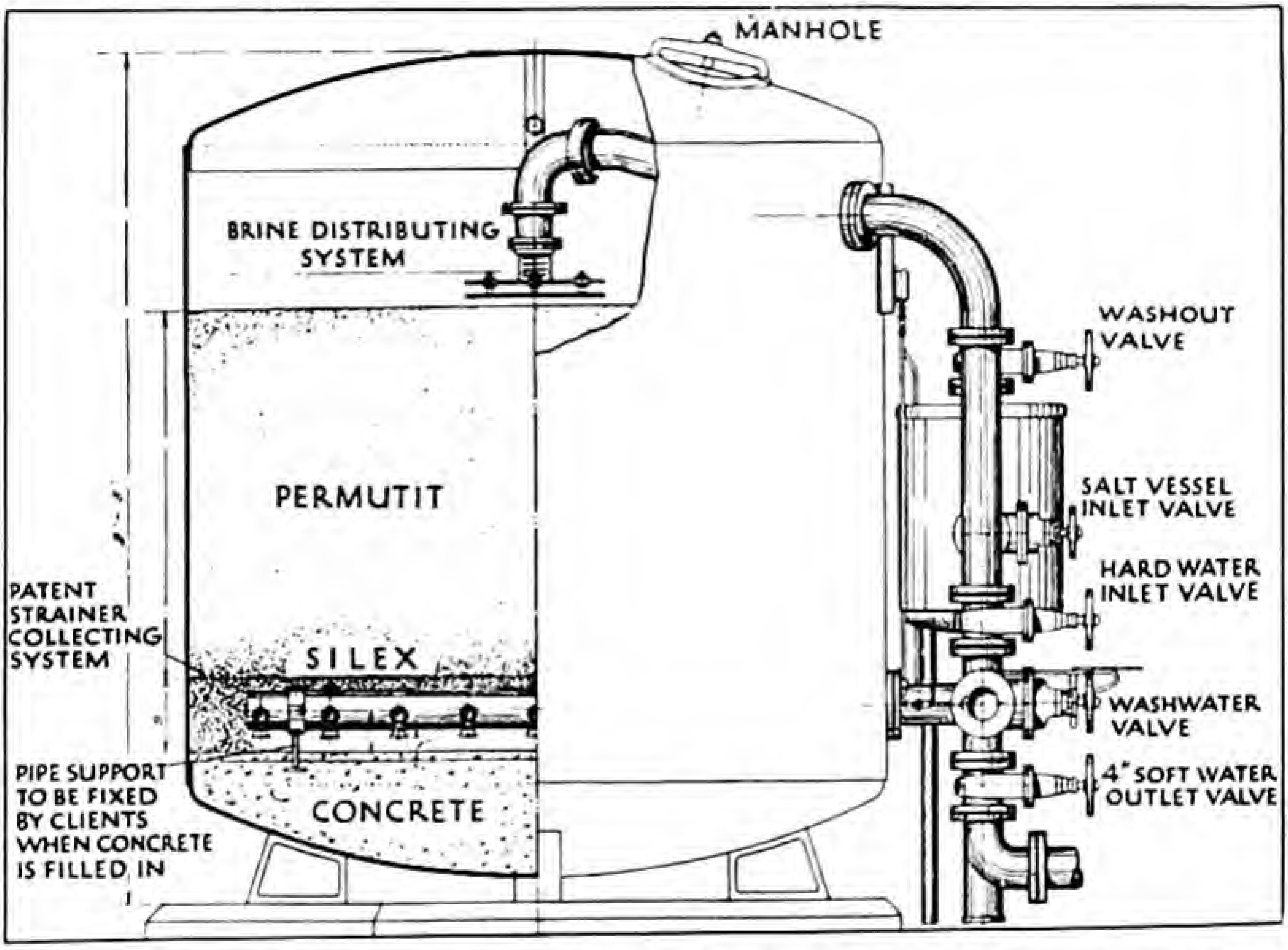
The water passes through a layer of artificial zeolite, and exchanges its calcium and magnesium for sodium from the zeolite. The composition of this zeolite is that of a hydrated sodium aluminium silicate of the formula $Na_2O.2SiO_2.Al_2O_3$, but for purposes of showing the exchange it may be considered as 'sodium zeolite.'

Calcium salt + sodium zeolite → sodium salt + calcium zeolite.

As the water passes through the tank containing the zeolite the

exchange takes place, and the water passing out will contain the sodium salts which do not react with soap.

Excess of temporary hardness. If excess of temporary hardness is present the water softened by the zeolite method will contain sodium bicarbonate, which, on heating, will leave sodium carbonate in the water and make it alkaline. To avoid this some of the hard water is run into the water leaving the softening tank, and the sodium carbonate



SECTIONAL DIAGRAM OF A BASE EXCHANGE WATER SOFTENING APPARATUS

in the softened water is thus used up in removing the hardness present.

After a certain amount of water has run through the softening tank only calcium zeolite will remain, and further water passing through will not be softened. The zeolite then needs regeneration. Each apparatus has to be regenerated when a definite amount of water has been passed through, and some may be obtained where this regeneration takes place automatically.

Regeneration. The regeneration process consists of passing a strong salt solution (sodium chloride) through the tank. In this way the sodium is taken up by the zeolite and the calcium chloride formed is

all washed out before water to be softened is allowed to pass through again.

calcium zeolite + sodium chloride → sodium zeolite + calcium chloride
in tank regeneration

The zeolite apparatus will last for many years, and is satisfactory for softening the water for laundrywork. Soap is economized, the formation of harmful calcium and magnesium soaps is avoided, and there is no accumulation in the water pipes. The disadvantages of the system are the cost of installation of special apparatus and the constant supplying of salt for regeneration.

Cleansing action of water:

(1) There is a certain adhesion between fabrics and water. Thus the water is able to penetrate the fibres and cause wetting.

(2) The particles of non-greasy dirt are oscillated away from the fabric into the water by means of pedesis or Brownian movement. Thus a fabric will be partially cleansed by steeping and friction. The presence of dissolved solids such as alkalis, or salts causing hardness, hinders this pedesis. The particles are made to aggregate, and the larger particles being unable to oscillate in the water will tend to resettle on the fabric.

(3) Water is an excellent solvent, therefore much soluble dirt and stain will be removed during the steeping process. Cold water is the best solvent for albuminous matter. Hot water will tend to melt and soften grease, but other cleansing agents are necessary to emulsify and remove greasy matter.

CHAPTER III

SOAP

SOAP is used to increase the cleansing action of water. It is necessary to have some knowledge of the composition and reactions of soap if the most suitable type is to be chosen for laundrywork.

Composition. Soap is composed of the sodium salts of certain fatty acids. Potassium and ammonium soaps are also made, but these are of little importance in the laundry.

Constituents. The chief materials used in soap-making are fats and oils of animal and vegetable origin; and alkalis, generally caustic soda or sodium carbonate.

Fats. A fat is a combination of fatty acid and glycerine, and is known as a glyceryl ester of the fatty acid. Examples of pure fats are stearin, palmitin, and olein. Most natural fats are made up of a mixture of these and other esters. The larger the proportion of stearin and palmitin in a fat, the harder the fat; a larger proportion of olein makes a softer fat. The composition of the fat also affects the soap made from it, and soaps made from stearin and palmitin are less soluble than those made from olein.

The fats used in soap-making include tallow or animal fat, palm oil, cottonseed oil, olive oil, coconut oil, and palm kernel oil. As the harder fats give soaps of the best cleansing power, some of the vegetable oils, e.g. cottonseed oil or maize oil, are first hardened by hydrogenation.

The soap manufacturer chooses a mixture of fats for soap-making, and these must be always available so that the proportion of each kind does not vary and each batch of soap produced has a similar composition.

Mineral oils, such as paraffin oil, do not combine with alkalis, and are said to be unsaponifiable. A little unsaponifiable oil may be incorporated in a soap to aid its cleansing properties.

Resin. This is extracted with turpentine from oleo-resin and sometimes used with fats in soap-making. It consists chiefly of abietic

acid, which combines with alkali to form a compound which froths and makes the soap more soluble. It is cheaper than fats, and thus a proportion of resin in soap will reduce the cost. The disadvantages of the use of resin are that it has less cleansing power than soap, and it tends to give a yellow colour to white materials, especially when combined with calcium from hard water.

Alkalis. The chief alkali used in soap manufacture is caustic soda or sodium hydroxide, and this is made from sodium chloride or lime and sodium carbonate. Sodium carbonate is used occasionally, either in the crystalline form or as soda ash, to saponify fatty acids.

Hydrolysis. Under suitable conditions a fat can be made to take up water and decompose into fatty acid and glycerine. This process is known as hydrolysis.

$$\text{Fat} + \text{water} \rightarrow \text{glycerine} + \text{fatty acid}$$

$$\begin{array}{l|lcr|lll}
CH_2 & OOC_{17}H_{35} & & H & OH & & CH_2OH \\
CH & OOC_{17}H_{35} & + & H & OH & \rightarrow & CH\,OH + 3C_{17}H_{35}COOH \\
CH_2 & OOC_{17}H_{35} & & H & OH & & CH_2OH \\
\text{stearin} & & & & \text{water} & & \text{glycerine} \quad \text{stearic acid}
\end{array}$$

The glycerine can be removed by dissolving in water and it has great commercial value. Some of the fatty acid is then neutralized with sodium carbonate to form soap.

$$\begin{array}{ccccccc}
2C_{17}H_{35}COOH & + & Na_2CO_3 & \rightarrow & C_{17}H_{35}COONa & + & CO_2 + H_2O \\
\text{stearic} & & \text{sodium} & & \text{soap} & & \\
\text{acid} & & \text{carbonate} & & & &
\end{array}$$

Saponification. The most usual method of soap manufacture is by the saponification process. Saponification is the process which takes place when a fat is acted upon by caustic alkali. The fat is first split up into fatty acid and glycerine, and then the fatty acid combines with the alkali to form soap.

$$\begin{array}{l|lcr|llr}
CH_2 & OOC_{17}H_{35} & & Na & OH & & CH_2OH \\
CH & OOC_{17}H_{35} & + & Na & OH & \rightarrow 3C_{17}H_{35}COONa + & CH\,OH \\
CH_2 & OOC_{17}H_{35} & & Na & OH & & CH_2OH \\
\text{stearin} & & & & \text{caustic soda} & \text{sodium stearate} & \text{glycerine} \\
\text{fat} & & & & \text{alkali} & \text{soap} &
\end{array}$$

Soap manufacture:

The boiling process. (1) A weak solution of caustic soda is first added to the melted fats in the soap pan, and the mixture is boiled by means of steam passed directly into the pan. This causes some of the fat to be saponified, and the presence of the soap formed causes the rest of the fat to be emulsified and thus more able to mix with the rest of the caustic soda which is then added at intervals. The boiling is continued for two or three days.

(2) The tank or soap pan will now contain soap, glycerine, excess caustic soda, and impurities. Salt is added, and as soap is insoluble in strong brine it separates out when a certain amount of salt has been put in. The liquid under the soap layer is known as 'spent lye,' and is run off, and glycerine distilled from it. The soap is then boiled with water or steam to make it into a paste again.

(3) The soap layer will contain a certain amount of unsaponified fat, so it is boiled again with more alkali until saponification is complete. The mixture is allowed to settle, and the 'half-spent lye' sink to the bottom. This contains excess alkali with a small amount of glycerine and salt left from the last process, and is used with fresh alkali in the next soap-making.

(4) Soap at this stage is then boiled with more water and steam, and after standing four layers will separate out. The top froth is skimmed off, the *genuine soap* layer is run off by a pipe into soap frames or into the crutching pan. The third layer, known as 'nigre,' consists of impure dark-coloured soap solution, and at the bottom is some alkaline liquid.

Genuine soap contains about 30 per cent water, and additions are made to it when it is in the crutching pan. These add to the weight of the soap, and thus make it less pure and cheaper. Some additions may have a slight cleansing action. The soap is made into bars, flakes, or powders.

The cold process. A quick method of soap-making which requires little special apparatus can be used in some cases. Coconut and palm kernel oil are acted upon by caustic soda. The fats are melted and well mixed with the caustic soda. The heat given out by the chemical reaction is sufficient to carry on the process, and after a day or two the saponification is complete. Owing to the fact that the soap will contain the glycerine and all other materials left after saponification it is necessary to use pure ingredients and the correct proportion of fat to alkali.

This soap is most suitable for washing in sea water, as it will dissolve in salt water, and has better cleansing power in cold than in hot water.

Properties of laundry soap. A satisfactory laundry soap must:

(1) Possess good cleansing powers.

(2) Contain no materials that will be harmful to the fibres or colour of the fabrics washed.

(3) Be readily soluble in water so that it may be useful for cool washes, dissolve quickly in the washing machine, and rinse out thoroughly after washing.

(4) Give a good lather, but not use up too quickly for friction washing.

The types of soap available for laundrywork. There are many varieties of household soap available for the housewife, and the following are the most common:

(1) *Neutral soaps*, which are fairly high-priced white soaps of good quality, containing no free alkali. A stearin or hard soap has best cleansing powers, but is less soluble than olein soaps.

(2) *Soap flakes*. These are obtained by flaking a hard soap, and drying slightly so that only 5–10 per cent of water is present. The best quality are made from neutral soap, but cheaper kinds may contain various adulterants.

(3) *Special cleansing soaps* consist of a good quality soap with a grease solvent incorporated.

(4) *Household soaps* are generally of a pale yellow colour. A good type to use for laundrywork is one that is made from about three-quarters of tallow and one-quarter of olive oil. A small amount of resin is not harmful unless the water is very hard, and its presence will help to reduce the price of the soap. This soap will be readily soluble in water, and will possess good cleansing powers.

(5) *Cheaper household soaps* for cleansing very soiled articles by friction washing may be of a darker colour and will probably contain less real soap and a certain amount of adulterants. Sodium carbonate, silicate, chloride, or sulphate and french chalk or talc may be added to the soap whilst in the crutching pan. The darker colour may be due to the resin present or to the less pure fats used. Sodium carbonate and sodium silicate will help slightly in the detergent action of the soap, but they help to harden the soap so that more resin (which tends to make soap soft and sticky) may be added and a much larger

proportion of water can be present. An excess of sodium carbonate will appear on the surface of soap as a white powder on storing. The other additions are used to increase the weight of the soap. Soaps containing a large quantity of resin, water, and adulterants will have little real cleansing action, and will be expensive in use as they will waste away rapidly in the water.

Disinfectant soaps have about 3 to 4 per cent of carbolic acid incorporated in them.

Turpentine is sometimes added to improve the cleansing power of soaps that are used for very greasy articles.

Soap powders consist of a mixture of powdered soap and sodium carbonate. The amount of soap present may be as low as 5 per cent, but is generally about 20–30 per cent. In the cheaper varieties sodium bicarbonate, sodium sulphate, sodium silicate, and french chalk may be included. Sodium perborate is used in soap powders that have a bleaching action, and are sold as 'oxygen washers.'

General properties and detergent action of soap. All liquids exhibit surface tension. When a drop of water falls on to a fabric it remains at first as a drop on the surface. This is because the water tends to draw away from the fabric and thus does not wet the fabric readily. For the same reason water and oil do not mix, as each tends to draw away from the other. Soap in solution has the power of reducing the surface tension, and will wet a fabric much more readily than plain water. Also grease will break up into small droplets in soap solution and form an emulsion or suspension of grease particles in the soapy water. The third factor in the cleansing process is that dirt particles have a greater affinity for soap than for the fabric, and they are held in suspension in the soap solution.

Therefore on washing a dirty greasy fabric in soapy water the soapy water will be able to penetrate the fibre and thus come in contact with the grease. This will be emulsified by the soap solution, and then the dirt particles released will be absorbed by the soap and held in suspension, so that they will not settle again on the fabric.

Excess of soap will hinder the cleansing process, and the best strength of soap for washing purposes is one that will allow about 0·4 per cent of free soap to be dissolved in the washing water. The hardness of the water, the amount of dirt, the amount of fabric in the water, and the type of fabric will affect the quantity of soap needed. Woollens that have been bleached with sulphur dioxide will react with soap until all

the acidity has been neutralized. In this case it is more sensible to steep the fabric in a weak alkaline solution to neutralize the acid before washing, so as to avoid waste of soap.

Soap forms a colloidal solution in water, and acts as a detergent because of its power of emulsifying grease. The presence of a small amount of free alkali will help this emulsifying power. In solution a small portion of the soap splits up or hydrolyses, and forms fatty acid and caustic soda. The alkali thus liberated also aids emulsification, but is not the chief factor. Stearin and palmitin soaps, which are less soluble than olein soaps, hydrolyse to a greater extent in water. Olein soaps, being more soluble, hydrolyse to a less extent, and therefore a less alkaline solution is formed. They also give a better lather and help pedesis, so that their cleansing power is satisfactory. The presence of alkali in solution hinders pedesis, so that in this way soaps containing free alkali will be less efficient cleansers.

CHAPTER IV

ADDITIONAL LAUNDRY REAGENTS

Soap solution:

Proportion. 4 oz. soap to 1 pint water.

Method. Shred the soap. Put into a pan with the water. This pan must be kept specially for laundrywork purposes. Heat soap solution slowly to avoid its boiling over.

Use. It is used for making a permanent lather on washing waters for all types of cleansing other than friction washing.

Sodium carbonate. Common washing soda, $Na_2CO_3 10H_2O$.

Washing soda is the alkali most commonly used in laundrywork. It is manufactured by one of two methods:

(1) The Leblanc process in which sodium chloride is treated with sulphuric acid, giving sodium sulphate and hydrochloric acid. The sodium sulphate is heated with coke and chalk, giving sodium carbonate and other by-products. The sodium carbonate is extracted with water. The solution is evaporated and the washing soda crystals are formed on cooling.

(2) The Solvay process, in which a saturated solution of sodium chloride becomes charged with ammonia gas and carbon dioxide. This produces sodium bicarbonate and ammonium chloride in solution. The sodium bicarbonate is heated to give the sodium carbonate.

Sodium carbonate loses the water of crystallization in a dry atmosphere, and becomes powdery, thus losing weight. This is noticed on washing soda that has been stored for any length of time.

Washing soda is used for:

(1) Water softening (see Chapter II).

(2) To emulsify grease.

(3) To counteract the effect of acids and remove acid stains on bleached cotton and linen fabrics.

It should not be used in excess, as this causes an alkaline solution which damages fabrics.

Washing powders. Many commercial washing powders are available. Their suitability for laundrywork purposes depends upon their composition. They usually consist of soap and an alkali, generally washing soda. Some powders, which contain sodium perborate, have a slight bleaching action. Powders which contain adulterants are quite unsuitable for laundrywork. Washing powders may appear to assist in cleansing operations by the action of soap and alkali on grease, but the damage to fabric caused by use of excess alkali must be remembered.

Soap flakes. Soap is dried and flaked. This makes a convenient substitute for soap solution in making a permanent lather on washing waters. Reliable makes are practically pure soap and safe to use for any fabric.

Borax. $Na_2B_4O_7$. This occurs naturally, and is sold as a white powder. It is not readily soluble in cold water, but when dissolved in hot water the solution is slightly alkaline, and may be used with safety on animal fibres. It is also used to neutralize acids in stain removal. Borax tends to reduce the alkalinity of soap solution, by reducing hydrolysis of the soap, hence its use in the washing water for especially fine fabrics.

Ammonia. NH_4OH. The chief source of ammonia is from the distillation of coal in making coal gas. The solution of the ammonia gas is used for neutralizing acids, and for removing the smell left after using Javelle water. Ammonia is more strongly alkaline than borax, and tends to remove colour from coloured fabrics.

Sodium perborate. $NaBO_34H_2O$. This is manufactured from borax, caustic soda, and hydrogen peroxide. With water sodium perborate forms an alkaline solution which gives up its oxygen and so bleaches.

$$\underset{\text{sodium perborate}}{2NaBO_3} \rightarrow \underset{\text{sodium borate}}{2NaBO_2} + \underset{\text{oxygen}}{O_2}$$

At boiling point its action on stains and fabrics is rapid, so care is needed in use; the strength of the solution must not exceed 1 teaspoonful to 1 pint of water. A low temperature must be employed to prevent damage to wool and silk. Various 'oxygen washers' may contain sodium perborate.

Starch is a carbohydrate with the formula $(C_6H_{10}O_5)_n$. This indicates that although the proportions of carbon, hydrogen, and oxygen are known the exact composition is not known, as the molecule is very

complex. Starch is made by plants through the combined action of carbon dioxide and water in the presence of chlorophyll in the green leaf during sunshine. It is stored by the plant in roots, tubers, and seeds to serve as food for the young shoot during its early development. These storage parts of the plant are treated so that the starch grains are eliminated. This is mainly a physical separation of the grains from the surrounding material. These grains are washed and allowed to dry, during which process the bulk of the starch cracks into the well-known lumps of laundry starch. Starch grains of different plants have characteristic formation by which they can be recognized easily under the microscope. All starch grains rupture with heat and moisture, forming a colloidal solution with boiling water. Starch gelatinization is assisted by high temperature reached as rapidly as possible. Thus in making boiling-water starch the water must be really boiling and poured on to the starch paste as quickly as possible to ensure the best result. The laundress makes use of this solution for stiffening cotton and linen fabrics. A laundry starch is required to give a solution that will penetrate fabric well, but at the same time leave it pliable, and give a smooth glossy surface that will be resistant to dirt. The addition of alkali, e.g. borax, to a starch paste increases its viscosity. This is not an important factor at the present time as, through the changes in textiles, starch is used much less than formerly, and where used is generally required to give less stiffness.

Rice starch gives a viscose solution that is generally suitable for laundrywork. It gives sufficient stiffness with pliability. The grains are very small and so are suitable for cold-water starching, as they give a very thorough penetration of the fabric.

Wheat starch gives a stronger viscose solution than rice starch, but is more expensive.

Maize starch gives a very strong viscose solution, leaving the fabric stiffer than is necessary, and with a rough feel. It is cheap, and sometimes mixed with other starches.

Potato starch has a large grain that is unsuited to laundrywork.

Blended starches. Many commercial starches are blended and mixed with some alkali, e.g. borax.

Coloured starches. Some starches are coloured to give an ecru tint, and some combined with blue so that blueing and starching can be done together. They are not generally useful starches, and the colour may disguise an inferior quality starch.

Boiling-water starch:

Proportion. 1 tablespoonful starch.
2 „ cold water.
1 pint boiling water.

Method. Measure the starch into a basin. Measure the cold water on to the starch. Mix to a smooth paste, using a wooden spoon. Pour over the boiling water quickly, stirring all the time, till a colour change takes place. This shows that the starch grains have burst, and formed a colloidal solution that has a stiffening property. This is full-strength starch, which will become too solid to dilute as it cools, therefore must be diluted immediately. Measure the quantity of starch, add to it an equal volume of hot water. This is 1:1 strength, and starch at this concentration can be kept till required. It can be diluted by additions of cold water, each equal in volume to that of the starch first made.

Use. It is used as a stiffening agent for cotton and linen fabrics. It must be dried into the fabric, then the fabric damped evenly before ironing.

Strength of starch for use. The strength of starch used depends upon two factors:

(1) The thickness of the fabric.
(2) The stiffness required in the fabric.

Full Strength Boiling-Water Starch	Cold Water	Article
1	2	Thin fabrics required very stiff.
1	3	Small articles required very stiff. Cotton damask.
1	4	Table linen.
1	6	Curtains.
1	8	Cotton undergarments. Cotton blouses.
1	10	Articles required slightly stiff.

Cold-water starch:

Proportion. 1 oz. starch
4 drops turpentine.
½ teaspoonful borax.
1 tablespoonful boiling water.
½ pint cold water.

Method. Weigh the starch, put into a basin. Drop the turpentine

on to the starch. Dissolve the borax in the boiling water in a measure. Add the cold water to the dissolved borax, and pour this on to the starch. Mix to a smooth paste. Strain through muslin. Cover and leave for $\frac{1}{2}$ hour before use. This allows the starch grains to soften. Stir very thoroughly before use.

Use. It is used to make thin muslin articles very stiff, and for the stiffening of gentleman's collars, cuffs, and shirt fronts. The material must be dry for this type of starching. Knead and squeeze the dry material in the starch mixture so that it will absorb the starch grains into the mesh of the fabric. Squeeze out. Rub off surface starch grains with a muslin wrung out tightly from cold water. Iron immediately. The important points in ironing cold-water-starched material are:

(1) A clean hot iron.

(2) Quick movement of iron over material.

(3) Even pressure to burst the starch grains and iron the material to dryness.

Blue. Blue is used by the laundress in the last rinse for bleached cotton and linen fabrics. Bleached fabrics lose their whiteness through use, wear, and the yellowing action of soap and alkali in cleansing processes. Blue is the complementary colour to yellow to produce whiteness in the fabric. Ultramarine blue is the type generally used by the laundress. This blue was formerly ground lapis lazuli, a natural but rare mineral, but it is now manufactured from soda ash, sodium sulphate, charcoal, sulphur, and clay. These are heated, and the coloured substance that is formed is ground, and compressed into cakes. The fineness of the ground powder is the important factor to the laundress, as too large particles will not stay in suspension a sufficient length of time, and will cause marking where they deposit.

The fine suspension of blue particles produces an even colouring on the fabrics. Ultramarine is a safe blue to use, because it is not harmful to fabrics, and is not affected by cleansing agents. Overblueing is easily removed from fabric by treatment with acetic acid. Washing powders and starch containing blue should be avoided, as they lead to difficulty in controlling the depth of colour. Overblueing is a common fault; complete absence of blue is preferable.

Prussian blue is ferric ferrocyanide and will form a fine suspension in water. It has been superseded in use by ultramarine because Prussian blue gives a green-blue coloration, and is decomposed by alkalis and

heat, leaving a deposit of iron. Thus soap or alkalis left in the fabrics due to faulty rinsing will react with this blue, and iron-rust marks will develop on ironing.

Soluble blues. These are completely soluble coal-tar dyes, such as methylene blue. They produce an even colour and no sediment, so are especially suitable for use in power laundries. They may be obtained in concentrated solutions or powder form. Careful control of the blueing is necessary, as these aniline dyes have a great affinity for materials and excess blue can only be removed by use of a reducing bleach.

Oxalic acid. $(COOH)_2$. This occurs naturally in plants such as sorrel and rhubarb. Commercial oxalic acid is made by treating sawdust with caustic soda and potash to give sodium oxalate; this is decomposed with lime to give calcium oxalate, which is again decomposed with sulphuric acid to give oxalic acid. It is a poison and should be kept in a jar, and labelled as such. It is used:

(1) To remove obstinate iron-rust stains. See Chapter V.
(2) As a bleach with potassium permanganate. See Chapter V.
(3) As a cleanser for white straw hats.

It has a strong action, and should be neutralized by use of borax or ammonia to prevent damage to fabrics.

Salts of lemon. COOH.COOK. This is the name given to the acid potassium salt of oxalic acid. It has not such a strong reaction with fabric as oxalic acid. It is a poison and should be kept in a jar labelled as such. Its use is similar to that of oxalic acid.

Acetic acid. CH_3COOH. Acetic acid is manufactured by the distillation of wood, and is extracted from the liquid distillate by treating with lime and then distilling with hydrochloric acid. It has the characteristic smell of vinegar, in dilute solution has no action on fabrics, and being volatile does not dry into the fibres. It decomposes ultramarine blue, so may be used to remove overblueing. An acetic acid rinse brightens the colour of coloured fabrics after washing.

Vinegar contains 6 per cent of acetic acid, and may be used in the same way as acetic acid for laundry purposes. It is made by the oxidation of a dilute alcoholic liquid in the presence of the acetic acid ferment, *Mycorderma aceti*.

Turpentine. $C_{10}H_{16}$. This is a colourless liquid hydrocarbon, obtained by distillation of the oleo-resin from a variety of pine trees that grow on the Mediterranean seaboard and in North Carolina. It

has a distinctive smell, is inflammable, and volatile. It is used to dissolve grease and paint, and as a cleansing agent in household soaps.

Paraffin. C_9H_{20} to $C_{17}H_{36}$. Paraffin oil was first obtained from the fractional distillation of shale oil. Most of the supply of paraffin now comes from the refining of petroleum.

Ethyl alcohol. C_2H_5OH. This is procured by the fermentation of sugar by yeast. It is very expensive, but it is a most satisfactory solvent for grass, medicine, and varnish stains.

Methylated spirits. $C_2H_5OH + CH_3OH$. This is a mixture of methyl and ethyl alcohols in the proportion of about 1 part of the former (or wood spirit) to 9 parts of the latter. It is coloured violet, as it is poisonous to drink. The colourless form may be obtained under the name of surgical methylated spirits.

Glue. This is a gelatinous substance obtained by boiling and chemically treating bones and hoofs. It forms a colloidal solution with water. Use of this is made in glue wash. See page 125.

Gum arabic. This is an exudation from tropical acacia trees. It is used in the making of gum water, the stiffening agent used for silk, rayon, lace.

Gum water:

Proportion. 4 oz. gum arabic to 1 pint cold water.

Method. Weigh the gum arabic, put into an earthenware jar, cover with the water and leave overnight. Stand the jar in a pan of water, and heat until the gum arabic is dissolved. Stir occasionally. Strain through muslin, and bottle. This gum water is used for stiffening by diluting with cold water according to the degree of stiffness required. Average proportion, 1 teaspoonful to $\frac{1}{2}$ pint water.

An alternative method to the use of gum water is to buy liquid glue, and dilute as required.

Chloride of lime. This is prepared by passing chlorine gas over slaked lime.

$$Ca{<}^{OH}_{OH} + Cl_2 \rightarrow Ca{<}^{OCl}_{Cl} + H_2O$$

It is a white powder with a strong chlorine smell. It decomposes readily, so should be bought in a container rather than in a packet, and should not be stored for long periods. It is never used in its original form in laundrywork owing to the undesirability of the presence of calcium salts in contact with soap and fabrics. Javelle water, which is sodium hypochlorite solution, is made from chloride of lime.

Bran. This is the outer covering of the wheat grain. It contains a certain amount of starch, gluten, and salts, which, on extraction, with water form a sticky colloidal solution which has cleansing properties, and is used as a bran wash. (See page 83.) Dry bran is heated and used in dry cleaning as an absorbent.

Fuller's earth. This is a natural clay of a non-sticky nature that has an absorbent action on grease. It is a very fine powder, which with grease aggregates into masses on the surface of the fabric, and so holds the grease apart. The masses are removed from the surface of the fabric by shaking. Fuller's earth is obtainable in natural or bleached powdered form.

French chalk. $CaCO_3$. This is very finely powdered chalk. It is white and in a pure form. Its action is similar to that of fuller's earth. It is most economical to buy it in perforated containers.

Carbolic acid or phenol. C_6H_5OH. This is obtained from coal tar. It is used in solution, or mixed with solids, as a disinfectant. It has a characteristic odour, and a corrosive action on the skin. It is a poison, and should be labelled as such during storage. It should only be used by those who understand its properties.

Petrol or benzine. C_5H_{12} to C_9H_{20}. These are obtained from the fractional distillation of shale oil or petroleum. They are highly inflammable; this fact must always be remembered when they are used as grease solvents in dry cleaning. They are volatile with a low boiling point. In each case the vapour spreads rapidly and is also highly inflammable. The utmost care must be taken in use. They must always be used out of doors, never in any place where the vapour can spread to a naked light. Used petrol or benzine must not be poured over grass, which it will kill, or down drains, where it will be a danger through its high inflammability.

Carbon tetrachloride. CCl_4. This is an efficient solvent for oil, fats, waxes, tars, and resins. It volatilizes readily, and has powerful anaesthetic properties, so should be used in well ventilated rooms, or in a closed dry cleaning tumbler. Owing to its low boiling point (76·8 °C.) it evaporates rapidly from fabrics. It is non-inflammable and non-explosive, so is very useful for home dry-cleaning, as it is quite safe apart from its anaesthetic properties. The vapour from carbon tetrachloride is heavy, so any one overcome by the fumes should not be allowed to lie flat in the vicinity of the solvent, but should be taken into the open air.

CHAPTER V

STAIN REMOVAL

MOST dirt can be removed from fabrics by the usual cleansing methods. Some discoloration may be present which does not yield readily to these methods, and requires special treatment according to its nature. Such discoloration is termed a stain.

The two essential factors in stain removal are:

1. The composition and colour of the fabric.
2. The nature and age of the stain.

General information regarding stain removal:

1. All stains are most easily removed when fresh.
2. Unknown stains should be treated by the least harmful methods first, e.g. cold water steep, hot or boiling water steep according to the fabric. This can be followed by mild, then strong reagents, and finally by a bleach.
3. Known stains should be treated by their specific reagent.
4. Several applications of a weak reagent are less harmful to fabric than one application of a strong reagent.
5. Bleaches should be used carefully, and only after other methods have been tried. The reaction of textile fibres to different bleaches must be remembered (see Chapter I).
6. Reagents may be spread on to white cotton and linen fabrics, and boiling water may be poured through the fabric.
7. Reagents must be made into a solution when used on coloured cotton, and linen, wool, silk, rayon.
8. The fabric should stay in the reagent only until the stain is removed; it should be taken out at once and washed to prevent any possibility of the reagent drying into the fabric and damaging it.
9. An acid stain-removal agent should be neutralized by an alkaline rinse.

Bleaching. Stains that have dried into the fibres of materials are sometimes difficult to remove. To effect their complete removal a bleach has to be used. Bleaching should be carried out carefully on

all fabrics; the affinity of different fibres for bleaches should be remembered (see Chapter I).

Bleaching agents can be divided into two classes:

1. Oxidizing bleaches provide oxygen which combines with the stain to form a colourless or soluble compound. All fibres are readily affected by oxidation, so an oxidizing bleach must be in contact with a fabric only until the stain is removed. Longer contact will cause tendering.

2. Reducing bleaches change the stain to a colourless substance generally by the removal of oxygen. The oxygen of the air may tend to cause a return of the colouring matter in the stain.

Household bleaching agents:

Oxidizing	*Reducing*
1. Sunlight and moist air.	1. Sodium hydrosulphite.
2. Sodium hypochlorite (Javelle water).	2. Commercial stripping agents.
3. Hydrogen peroxide.	
4. Sodium perborate.	
5. Potassium permanganate.	

1. *Sunlight and moist air.* The oxygen of the air acts as a bleaching agent, and more especially in the presence of moisture and sunlight. Hydrogen peroxide is probably formed so that slight alkalinity in the fabric will aid the bleaching. Too long exposure of moist fabrics to direct sunlight may cause tendering. Clear frosty air has definite bleaching properties, so that care should be taken to avoid putting coloured articles outside in frosty weather. Grass bleaching is used in bleaching linen. Oxygen is liberated from the plants when the chlorophyll of the leaf takes in carbon dioxide in the presence of sunlight, and uses the carbon to build up carbohydrate. The housewife keeps white clothes a good colour by the use of outdoor drying, and sunlight bleaching can be used for stain removal from bleached cotton and linen fabrics.

Method. Moisten fabric and expose to sunlight. Remoisten when the fabric dries. Repeat until the stain is removed.

2. *Javelle water.*

1 lb. washing soda	½ lb. chloride of lime
1 quart boiling water	2 quarts cold water.

Dissolve the washing soda in the boiling water. Mix the chloride of lime with the cold water, allow to settle, strain off the clear liquid. Mix together the dissolved washing soda and the filtrate from the chloride of lime. Allow the precipitate of calcium carbonate that is formed to settle. Strain off the clear liquid and store in dark-coloured bottles as it is unstable to light. This liquid called Javelle water is sodium hypochlorite, which readily gives off 'nascent' oxygen, a powerful bleaching agent.

It should be used as a bleach for white cottons and linens. Use half Javelle water and half hot water. Leave the stain in the bleach till it is removed. Wash out very thoroughly, never allow the bleach to dry into the fabric.

A small amount of ammonia in the rinsing water will help to remove the smell of the bleach from the fabric.

NaCl

$$Ca(OCl)Cl + Na_2CO_3 \rightarrow CaCO_3 + \cancel{CaCl} + NaOCl$$

$$NaOCl + H_2O \rightarrow NaCl + O$$

A small amount of free soda in Javelle water helps to soften water, and so prevents hardness reacting with sodium hypochlorite to form more harmful calcium salt.

Hydrogen peroxide. H_2O_2. Hydrogen peroxide is prepared by treating barium peroxide with cold dilute sulphuric acid. It is sold as a slightly acid solution at a concentration of '10 volumes' or '20 volumes.' This means that 1 pint of hydrogen peroxide can give 10 or 20 pints of oxygen respectively. The solution acts as an oxidizing agent by giving up one atom of oxygen and leaving water. This action takes place most rapidly in alkaline solutions. It is a safe bleach, as it has no harmful effect upon animal fibres and may be used for bleaching wool, silk, and rayon. For use on silk and woollen fabrics a dilution of one part of '10 volume' hydrogen peroxide in six parts of water should be used with the addition of ammonia to make it slightly alkaline. For cotton and linen the 'ten volume' solution need not be diluted.

$$2H_2O_2 \rightarrow 2H_2O + \overset{\text{bleaches}}{\overset{\uparrow}{O_2}}$$

Sodium perborate. $NaBO_34H_2O$. This is manufactured from borax, caustic soda, and hydrogen peroxide. With water the sodium perborate splits up and oxygen is evolved which bleaches.

$$2NaBO_3 \rightarrow 2NaBO_2 + O_2$$

This reaction is much more rapid with hot water, and at boiling point the action is further increased. Care is needed in use in regard to the proportion, and the length of time in contact with fabrics at high temperatures. Sodium perborate is used in various 'oxygen' washing powders, and the action is especially effective when the cleansing is started from low temperature and the heat gradually increased.

Potassium permanganate. $K_2Mn_2O_8$. Potassium permanganate has a high content of oxygen which will combine with and so remove certain stains. However, a brown coloration, due to manganese dioxide, is left in the fabric. This can be removed by treating with oxalic acid solution, which changes the manganese dioxide to soluble salt in the presence of acetic acid.

$$\underset{\text{potassium permanganate}}{K_2Mn_2O_8} \rightarrow \underset{\text{manganese dioxide + oxygen}}{K_2O + 2MnO_2 + 3O}$$

$$MnO_2 + \left(\begin{matrix}COOH \\ COOH\end{matrix}\right. + 2CH_3COOH \rightarrow (CH_3COO)_2Mn + 2H_2O + 2CO_2$$

1. Use 1 oz. of potassium permanganate to 1 gallon of water.

2. Use 1 oz. of oxalic acid to 1 gallon of water plus acetic acid.

The stain is steeped in the first solution for fifteen minutes, and then for a short time in the acid solution to remove discoloration and well rinsed.

Reducing Bleaches. *Sodium hydrosulphite.* $Na_2S_2O_4$. This substance is sold as a white anhydrous powder under various names. It absorbs oxygen rapidly, especially when dissolved in water, and changes first to sodium metabisulphite and then to sodium sulphate, liberating sulphur dioxide.

1. $$\underset{\text{sodium hydrosulphite}}{2Na_2S_2O_4 + O_2} \rightarrow \underset{\text{sodium metabisulphite}}{2Na_2S_2O_5}$$

2. $$\underset{\text{sodium metabisulphite}}{Na_2S_2O_5 + O_2} \rightarrow \underset{\text{sodium sulphate}}{Na_2SO_4} + \underset{\text{sulphur dioxide}}{SO_2}$$

The bleaching action is due first to the removal of oxygen from the stain, and secondly to the action of the sulphur dioxide which becomes oxidized to sulphuric acid and liberates nascent hydrogen, which reacts with the stain to form a colourless compound. The powder must be stored in airtight tins or it will become caked and ineffective,

owing to the absorption of oxygen from the air. This bleach is useful for removing dye stains that are not affected by oxidizing bleaches. No fabrics are harmed by this bleach as long as the temperature of the solution is suitable.

Proportions for use of stain removal agents:

Soda Borax Tartaric acid Salts of lemon Oxalic acid Ammonium carbonate	1 oz. to 1 pint boiling water.
Sodium perborate	1 teaspoonful to 1 pint boiling water.
Javelle water	½ Javelle water, ½ hot water.
Hydrogen peroxide	1 part hydrogen peroxide to 6 parts water; temperature of water depends upon fabric being treated.
Sodium hydrosulphite	½ oz. to 1 quart.

Use of grease solvents. These are used to dissolve grease that has saturated through the fibres of materials. Spread the stain right side down on a pad of cloth or blotting paper. Saturate a pad of cotton wool with the grease solvent. Work round the stain from the outside towards the centre. The grease will become absorbed by the pad underneath. The surface tension of the grease is greater than that of the solvent, so that when the solvent is applied to the outside of the stain the grease tends to accumulate in the centre. The disadvantage of this method for spotting fabrics is that the dirt is removed as well as the grease, and often a ring is formed around the part that has been cleansed. It is a useful method to employ for the removal of grease stains from fabrics before washing when the temperature of the wash water is such that it has little effect on grease. Grease solvents dissolve rubber, so must not be used on rubbered garments. Typical grease solvents are petrol, benzene, carbon tetrachloride.

Dear [illegible]
I have gone through this boo[illegible]
[illegible] most [illegible]
[illegible] whole [illegible]

as waiting for you, I read this book letter by letter and
directly spoke the language of my heart. You are not in wron
book was really a huge
ntein
you.

STAIN REMOVAL CHART

Stain		Fabric	Method of Removal
Tea *Coffee* *Cocoa*	(*a*) Fresh	Bleached cotton and linen	Pour boiling water through the stain immediately it occurs. Wash and boil.
		All other fabrics	Steep immediately in warm water. Repeat till stain is removed. Wash according to fabric.
	(*b*) Dry	Bleached cotton and linen	1. Steep in glycerine overnight. This may dissolve the stain. 2. Spread borax over the stain, pour boiling water through. 3. Bleach with Javelle water.
		Unbleached cotton and linen	1. Steep in glycerine overnight. 2. Steep in a hot tartaric acid solution. 3. Steep in a hot borax solution.
		Coloured cotton and linen	Treat as for unbleached fabrics. Fast dyed fabrics may be treated carefully with Javelle water.
		Wool, silk, rayon	1. Steep in a warm borax solution. 2. Steep in a warm hydrogen peroxide solution.
Fruit and Wine			These stains are mainly acid, and yield to treatment with an alkali.
	(*a*) Fresh	Bleached cotton and linen	Cover the stain with salt to prevent it spreading. Pour boiling water through. Repeat till much of the stain is removed. Wash and boil.

STAIN REMOVAL CHART—*continued*

Stain	Fabric	Method of Removal
Fruit and Wine—continued	All other fabrics	1. Steep in warm water, repeat till the stain is removed. 2. Steep in a warm alkaline solution.
(*b*) Dry	Bleached cotton and linen	1. Spread borax over the stain, pour boiling water through. 2. Steep for five minutes in a hot sodium perborate solution. 3. Spread ammonium carbonate over the stain pour boiling water through. 4. Treat with Javelle water.
	All other fabrics	1. Steep in a warm solution of sodium perborate. 2. Steep in a warm solution of hydrogen peroxide.
Mildew		This is formed by the growth of a fungus on damp fabric.
	Bleached cotton and linen	1. Bleach by sunlight (see page 35). 2. Bleach with Javelle water.
	All other fabrics	Bleach with hydrogen peroxide.
Grass	All fabrics	Steep in surgical methylated spirit or ethyl alcohol till the green colouring (chlorophyll) has been removed.
Blood	All washable fabrics	Steep in cold water and salt till the stain is dissolved from the fabric. Rub in this steeping water if necessary. Proportion: 1 tablespoonful to 1 quart. Bleach any resulting stain on fabrics with sodium perborate solution or Javelle water according to fabric.

		Unwashable fabrics	Cover the stain with a paste of starch and cold water. Leave a short time to absorb the stain. Repeat if necessary.
Perspiration		Bleached cotton and linen	1. Steep in cold water before washing. 2. Wet the stain, spread in strong sunlight, re-wet as the fabric dries, and repeat till the stain is removed. 3. Treat with Javelle water.
		All other fabrics	1. Wash. 2. Bleach according to fabric.
Grease	(*a*) Solid	All fabrics	1. Scrape off as much as possible. Place the stain over absorbent paper. Place a moderately hot iron on top; working from the outside of the stain towards the centre.
	(*b*) Liquid (including fish oils)	All washable fabrics	Wash with hot water and soap. This removes grease that has spread into the fibres of materials in all cases where the water is hot. The temperature of the water for silk and rayon is not sufficiently hot to melt some types of grease, so a grease solvent or absorbent should be used whilst the material is dry before washing.
		Unwashable fabrics	1. Cover the stain with french chalk, leave some time for this to absorb the grease. 2. Treat with a grease solvent.
	(*c*) Mangle grease	All fabrics	This is very difficult to remove as it is thick grease mixed with metal rubbings. Steep and rub in paraffin, then wash.

Stain	Fabric	Method of Removal
Tar	All fabrics	Scrape off any thick surface tar. Soften remaining tar with a soft fat or oil. Treat the material with a grease solvent.
Iron rust		This stain is caused by the formation of ferric oxide on fabric. It is removed by the action of an acid, which causes the formation of a soluble colourless iron salt. Iron-rust stains should be removed before fabric is wetted as dampness spreads this stain. Javelle water fixes iron-rust stain into fabric, so must never be used.
	Bleached cotton and linen	1, Spread salts of lemon over the stain, pour boiling water through. 2. Use oxalic acid solution for obstinate stains.
	All other fabrics	The same methods used as for bleached fabrics, but always use warm solutions.
Ink		Writing inks consist of a metal and a dye, hence two treatments are necessary: treatment with an acid to act on the metal, and with an alkali to neutralize the acid and act on the dye.
(*Black ink*) (*a*) Fresh	Bleached cotton and linen	1. Wash out as much as possible. Spread salts of lemon over the stain, pour boiling water through. Wash and boil. Treat with borax if washing is not to be done immediately.

	All other fabrics	Wash out as much ink as possible. 1. Steep in milk till the milk sours. The lactic acid formed reacts with the ink. This is advisable for white fabrics only. Wash according to fabric. 2. Spread tomato juice over the stain. Leave 1 hour. Wash. This is effective for all coloured fabrics.
(*Black ink*) (*b*) Dry	All fabrics	1. Treat with alternate hot solutions of salts of lemon, and borax or sodium perborate. Repeat till the stain is removed. 2. Bleach according to fabric.
(*Red ink*)		This stain washes out unless the ink has been made with a persistent dye.
	All fabrics	1. Steep in borax solution. 2. Steep in ammonia solution. 3. Bleach according to fabric.
(*Marking ink*)		This stain is very difficult to remove, and should be treated when fresh.
	All fabrics	1. Steep in iodine solution and follow by steeping in sodium thiosulphate solution. Wash. 2. Bleach according to fabric.
(*Indelible ink*)	All fabrics	1. Steep in ethyl alcohol. 2. Bleach according to fabric.
Iodine	All fabrics	1. Steep in ethyl alcohol. 2. Steep in sodium thiosulphate solution.
Medicine	All fabrics	Steep in ethyl alcohol or surgical spirit. Treat any resulting rust stain by the usual method.

STAIN REMOVAL CHART—*continued*

	Stain	Fabric	Method of Removal
Blue	(*a*) Ultramarine	All fabrics	Steep in a hot or warm solution of acetic acid and water. Proportion: 1 tbspful. to 1 pt.
	(*b*) Methylene	All fabrics	Use a reducing bleach.
Dye		All fabrics	Bleach according to fabric.
Transfer		All fabrics	Steep in surgical methylated spirit, or ethyl alcohol. Wash according to fabric.
Paints		All fabrics	1. Paints made up with linseed oil should be steeped in turpentine. Any resulting colour stain washed out, and bleached if necessary. 2. Cellulose paints should be steeped in petrol. 3. Varnish and lacquer paints will dissolve in methylated spirit.
Varnish		All fabrics	Steep in surgical spirit or commercial methylated spirit.
Blacklead			This stain is very difficult to remove and should be treated when fresh. 1. Steep in carbon tetrachloride. Wash and boil. 2. Chloroform will dissolve this stain but it is not very practicable.
Scorch			The fibres of the material are burned and bleaching is the only method that is effective. Excessive bleaching to remove scorch may result in damage to fabric.
		All fabrics	Sunlight bleach for slight scorch. Chemical bleach according to fabric for severe scorch.

CHAPTER VI

PRINCIPLES OF CLEANSING AND THEIR APPLICATION

THE dirt which soils fabrics is either loose dirt resting on the fibres, or fixed dirt held on to the fibres by grease. The loose dirt can be removed by mechanical methods, such as brushing and shaking, or by the action of pedesis in steeping. The fixed dirt must have the grease removed from the fabric first by means of absorption, solution, or emulsification.

Friction Washing:

Use. This method of cleansing is suitable for very soiled articles made of strong unbleached or bleached cotton and linen.

Method. It can be carried out in any of the following ways:

1. *Hand friction.* This is suitable for small articles that are lightly soiled.

Hot water and well dried soap are required.

Wring the article out of the steeping water. Place in the hot water and saturate it. Squeeze out a part of the article and soap that part. Holding the material between the hands, rub one part of the soaped material on another soaped part. This causes a permanent lather to be formed in the soaped portion; this lather cleanses the fabric. Rinse the soiled lather into the hot washing water. Squeeze out another part of the article, and repeat the process. Continue until all the article is cleansed.

2. *Friction by use of scrubbing brush.* This method is suitable for small articles of any strong fabric that are very soiled.

Hot water, well-dried soap, a soft-bristled brush are required.

Wring the article from the steeping water. Saturate with the hot washing water and wring out. Spread on a flat surface, and rub over with the wetted cake of soap. Scrub the material in one direction, causing a permanent lather in the fabric as it is scrubbed. Work over the whole of the article in this way. Rinse the soiled lather into the hot washing water.

3. *Friction by use of a rubbing board.* This method is suitable for articles of any size that are very soiled. It is most conveniently carried out in a washing sink or deep bath.

Hot water, well-dried soap, and a rubbing board are required.

The rubbing board may be of corrugated wood, zinc, or glass. The side of a sink or bath may be corrugated to act as a rubbing board.

Saturate the article with the hot washing water. Place a part of it on the rubbing board, and soap well. Rub one part of the soaped material on another part over the corrugations of the board. This causes a permanent lather in the part of the material being rubbed. Rinse the soiled lather into the hot washing water. Work over the whole article in this way until it is clean.

Suction washing:

Use. This is a quick and practical method of cleansing soiled articles and garments of any fabric or colour. The cleansing action does not damage any of the textile fibres.

Apparatus. A suction washer is used. This consists of a hollow cup of non-rusting metal. It may be a small size for use in a bowl, or a large size for use in a tub. Washing machines of household and institutional sizes are available that have non-rusting metal suction cups as their cleansing apparatus.

Application. Prepare the washing water of the correct temperature for the fabric being treated.

Make a permanent lather on the water with soap solution or soap flakes.

Place the soiled articles in the water and work the suction washer on top of them until they are cleansed.

Use as many waters as required to cleanse.

Rinse the soiled soapy water out very thoroughly, using warm water for the first rinse for all fabrics.

The hollow cup is pressed down on to the top of the clothes. This forces the air from inside the cup out through the holes at the side. The vacuum formed causes the soapy water to be drawn up through the clothes. The repeated suction of the soapy water through the clothes brings about the cleansing of the fabric.

Kneading and squeezing washing:

Use. This is the most useful method of washing by hand. It does no damage to any of the textile fibres nor to the texture, weave, or colour

of any fabric. It is very suitable for fabrics to which hand friction in any of its forms cannot be applied, i.e. wool, silk, rayon, coloured fabrics of any fibre. It is an advantage that no special apparatus is needed, hence no outlay to the housewife. It can be carried out in any washing bowl or basin. The cleansing agent is soap solution or soap flake, and water of the correct temperature for the fabric being treated. Its disadvantage is that it is a slow method as articles have to be treated individually, and this is uneconomical of time and energy.

Application. Prepare waters of the correct temperature for the fabric being treated; usual temperature 100°–110° F.

Make a permanent lather on one or two waters, according to the number of articles being washed, and their dirtiness.

Prepare rinsing water of the correct temperature; the first rinse after washing must always be warm.

Knead and squeeze the soiled fabric in the warm soapy water; the passage of this water through the fabric cleanses it.

Use as many soapy waters as required to cleanse. Very soiled parts should be placed flat on the palm of the left hand, and have additional lather patted through them, or have the additional lather very thoroughly squeezed through by use of the thumbs and first fingers.

Rinse thoroughly according to fabric.

An alternative method of making the permanent lather on washing waters is to use any reliable washing powder. Powders that contain sodium perborate are particularly useful for cleansing light-coloured silk, and rayon that has become discoloured through use. The oxygen that these powders release has a slight bleaching action on most discoloration.

Use of soaps and powders for modern methods of boiling. Many soaps and washing powders are available, the makers of which advise their being used in the boiler directly in contact with clothes that have not been previously cleansed. The efficiency of the soap or powder generally lies in some constituent which either emulsifies or dissolves grease, or has a bleaching action through the release of oxygen.

Clothes that are evenly soiled, e.g. table linen and bed linen free from stain, are the only kinds that are suitable for this treatment, and they should be given a cold steep to remove loose dirt, starch, and stain of a protein nature.

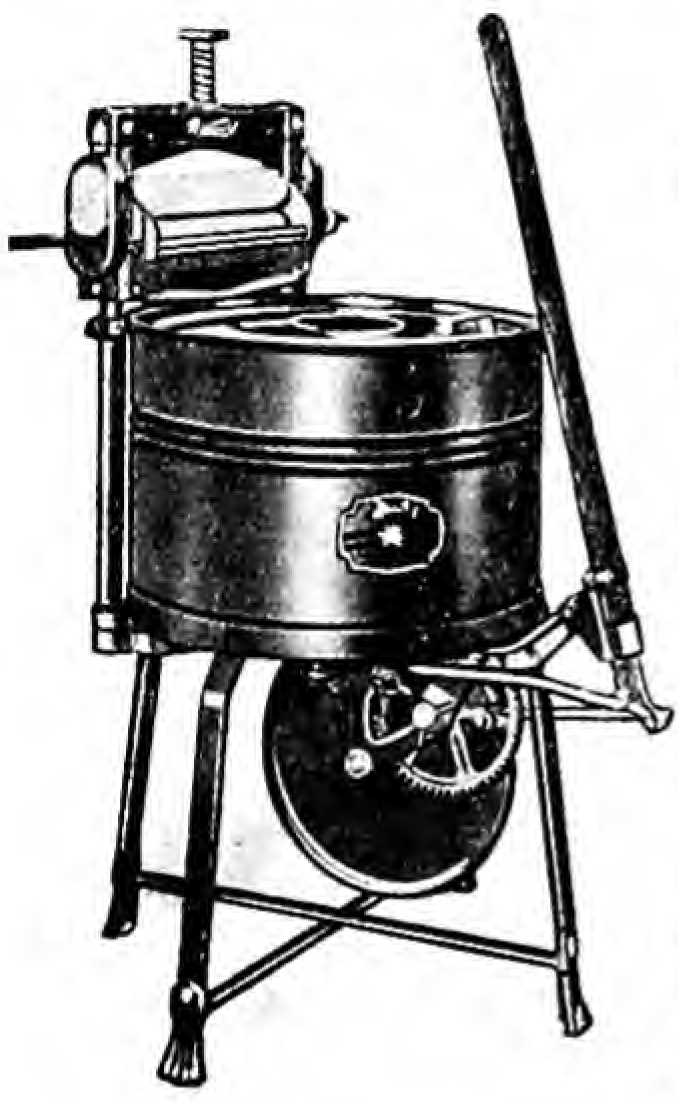
The cleansing action takes place by the soapy water containing the special grease- or stain-remover boiling *through* the fabric. There must be combined chemical and mechanical action for this type of cleansing

to be successful. The central spray device which is fitted into most modern wash boilers gives a very efficient action for this method of cleansing. The water carries the dirt out of the fabric, as it passes through, and holds it in suspension or solution, therefore the fabric must not be left in contact with the water too long. Very thorough rinsings from the soiled soapy boiling water is a most important part of this method of cleansing.

Large-scale washing apparatus. Suitable apparatus must be employed for cleansing large quantities of clothes. Such apparatus may be:

(*a*) Hand operated.
(*b*) Electrically driven.

The selection of such apparatus depends upon many factors:

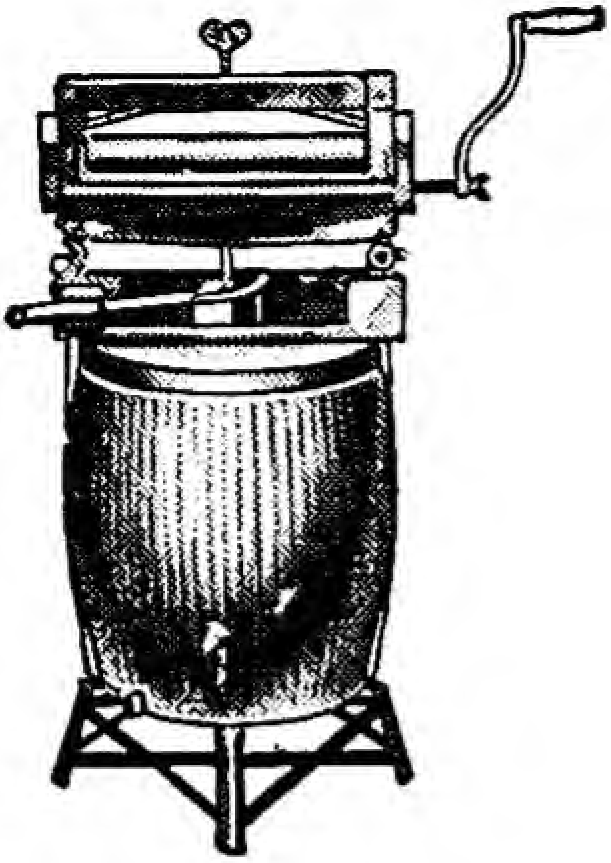


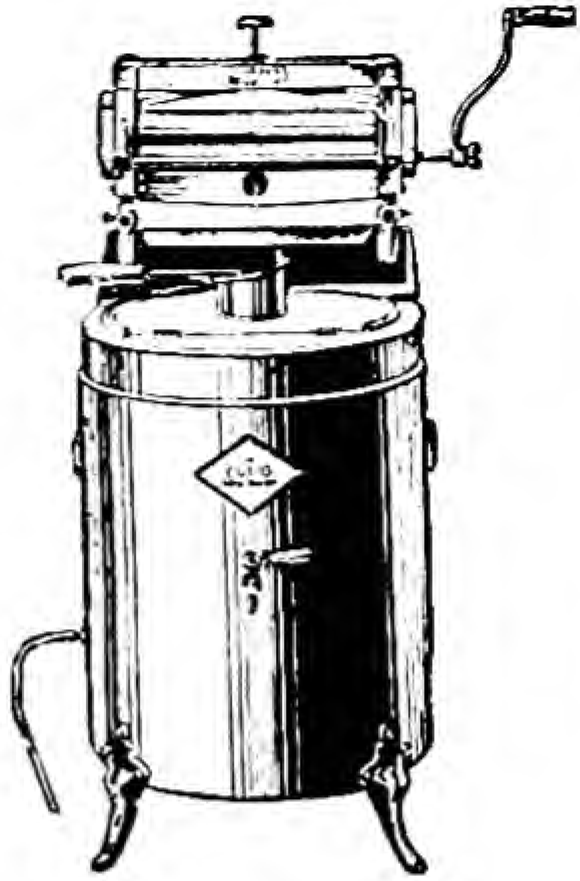
HAND-OPERATED WASHER WITH DOLLY ACTION

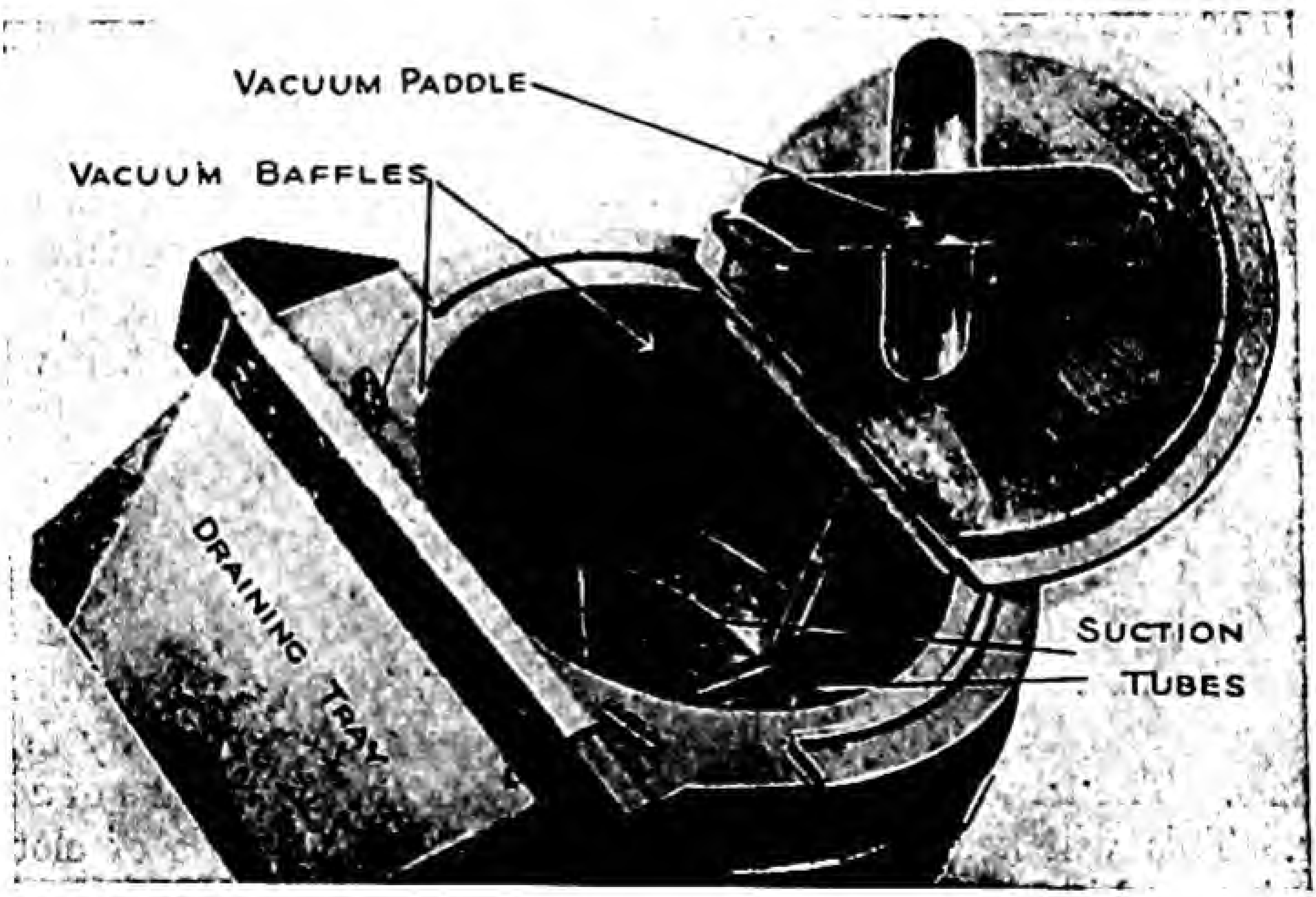
1. Initial outlay.
2. Running costs.
3. Availability of water, gas, electricity.
4. Amount of washing to be done and frequency with which the apparatus will be used.
5. The type of washing to be done. A machine with a cleansing action suitable for all fabrics is the type required by the housewife.
6. Space in which the apparatus has to be used, and stored.

Cleansing action. The cleansing action of all large-scale washing apparatus depends upon the movement of soiled fabric in soapy water so that the soiled matter is transferred into the water. Different types of apparatus are used to bring about this movement of fabric. The principal are:

1. *Dolly tub and peg or suction washer.* A tub of wood or non-rusting metal is half filled with hot soapy water. A wooden peg is used to turn and lift the clothes in the water; this gives a very efficient cleansing by friction and suction. A number of articles can be cleansed together, but this method involves expenditure of both time and energy by the worker. A long-handled suction washer can be







HAND-OPERATED WASHING MACHINES

The machine shown at top right can also be used as a boiler

used instead of the peg; this gives a really efficient cleansing action by suction. It involves the same expenditure of time, but very much less expenditure of energy. There are many types of washing machines in which these actions are used. Some inexpensive hand-operated washers consist of a non-rusting metal tub in which a wooden dolly or a suction cup is worked by means of a lever attached to a handle. Electrically driven machines have the dolly or suction cup operated from an arm fixed across the top of the washing tub, or from a fixture in the lid of the tub.

Care has to be taken in packing the dolly type of machine, so that the dolly can work effectively. Too tight packing interferes with movement, and gives ineffective cleansing.

2. *Rotary washer*. A perforated wood or metal cylinder carrying the clothes rotates inside a metal cylinder carrying the soapy water. The inner cylinder has partitions: either short ones on its inner surface in small machines, or the whole cylinder divided into separate compartments in large machines. The inner cylinder rotates a given number of times clockwise, then anti-clockwise. The outer cylinder is half filled with soapy water, so that the clothes are carried round a given distance, and drop back into the soapy water. These machines must be packed so that there is no interference with this drop, as it is an important part of the cleansing action. The number and size of the perforations on the inner cylinder of this type of machine is a most important factor in causing efficient cleansing by suction.

3. *Oscillatory washer*. This consists of a metal container which rocks. The clothes are placed in warm soapy water in the container; this rocks, throwing the clothes from side to side in the soapy water. The cleansing action is thorough and rapid, and suitable for all fabrics. This is an American type of washer, and is not retailed in all countries.

4. *Central agitator washer*. This is a very general type of washer for household use. The agitator is fixed to the lid of the washer in hand-operated models, and to the base of the washer in electrically driven models. The hand-operated washer can be heated by means of a gas-ring. This will keep the water hot for successive loads of clothes, and the machine may be used as a boiler after the washing is completed. Models of this type can save the housewife having two pieces of apparatus, i.e. washer and boiler. All models are fitted with either a wringer or hydro-extractor; they are of household size, and fit into very little space. The cleansing action is suitable for all fabrics, and the machines are sufficiently large to take any household article.

CHAPTER VII

LAUNDRY APPARATUS

Storing:

1. *Linen cupboard.* A special cupboard is the ideal place for storing clean household linen. It should have ample shelf accommodation, so that linen can be kept in separate piles. A basket may be kept on the floor into which soiled household linen should be placed to be stored a short time only before washing.

2. *Linen basket.* A wicker basket, preferably with a cotton bag fitted as a lining, this being taken out for washing along with the clothes. This basket is suitable for keeping in a bedroom, and it can be obtained in many different colours and finishes, so that it can fit into colour schemes.

3. *Linen bins.* These are enamel bins, finished in different colourings, and are suitable for storage of soiled linen in a bathroom.

4. *Linen bags.* These are only suitable for small amounts of soiled personal garments, and are usually kept in a bedroom.

5. *Clothes basket.* The wicker clothes basket that is used during washing and drying operations can be used for storage of soiled linen in an outside washhouse.

6. *A small store cupboard*, or one part of a household store cupboard, should be kept for laundry stores. Stone jars are suitable for storing laundry materials. The jars should be labelled; anything poisonous should have a red 'Poison' label in addition.

Steeping:

1. *Metal or wooden tub or washing machine*, used for large household articles.

2. *Small bowls or baths* of wood, papier mâché, zinc, enamel, or blocked tin, used for small quantities of clothes.

3. *Household buckets*, used for dusters.

Wooden tubs must be clean or they will mark the clothes. They should be rinsed thoroughly with warm water after use with soapy water, and have clean cold water left in them till the next time they are required for use.

All metal bowls should be dried after use, and stored so that they keep dry. Zinc baths should be kept clean with hot soapy water, and the use of a paraffin cloth when necessary. Scouring these baths with abrasive agents will damage the zinc in time, and expose the iron foundation. It is most important not to steep clothes in any metal bowl, unless its rust-proof coating is intact. Chipped places on enamel bowls can be painted with bath enamel.

Papier-mâché bowls are light weight to use, and noiseless. They must be carefully used, always dried out, and stored dry. They can be mended with plastic wood, and kept in good condition by painting with any good bath enamel.

Bowls that are to be carried full of water should be light weight, and it is an advantage to have those with securely fixed handles. Some corrugated zinc bowls can be obtained with a corrugated rubbing board forming part of their construction at one side and a soap-dish at the other. These are useful when very soiled articles are to be cleansed.

Washing. The type of washing apparatus that a household will have depends upon the amount of washing undertaken. There must be suitable and adequate apparatus if all washing is to be done at home.

1. *Dolly tub and peg, or large suction washer.*

2. *Hand-operated washing machine.*

3. *Electrically driven washing machine.* See Chapters VI and VIII.

4. *Laundry sinks.* These may be of wood or porcelain. They should be of such a height that the worker can stand with her back straight when working. They should not be too deep as this necessitates a waste of water. For a worker of average height the top rim of the sink should be 36 inches from the ground. A wooden rack can be used to correct the height of the sink for shorter people. There should be adequate draining-board space to each sink, so that damp clothes can be put down near the worker. The sink should be supplied with hot and cold water, and have an overflow pipe.

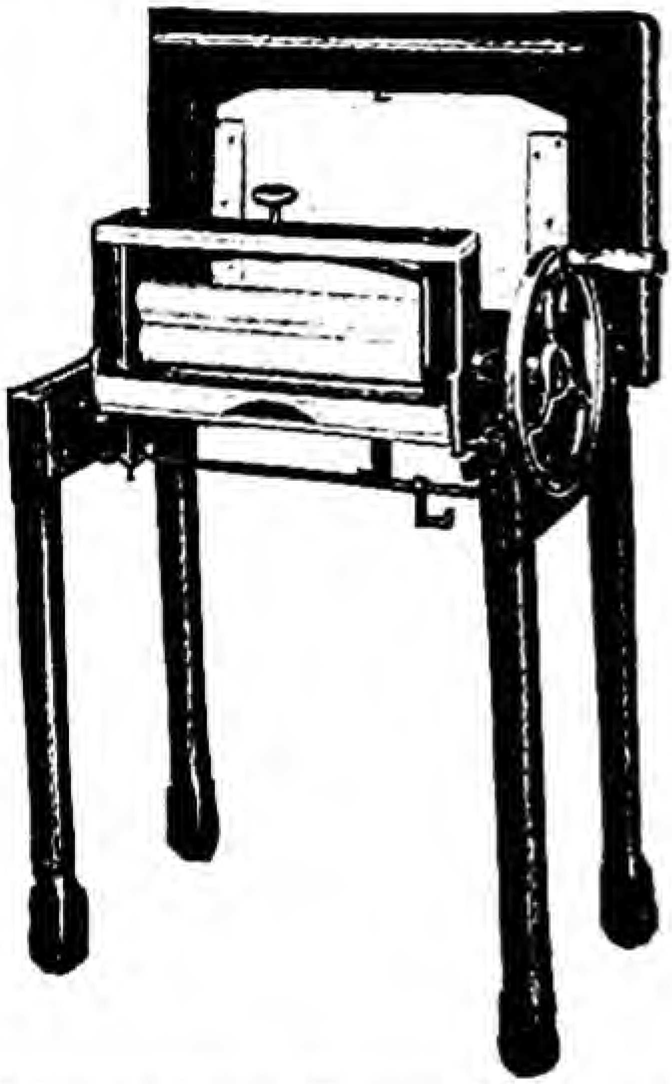
5. *Laundry bench.* A wooden bench, or a collapsible stool serves useful purposes. It can be used by short people for holding baths or bowls during washing, and it is very useful for standing by the boiler to hold the bowl whilst clothes are being taken from boiling, or using with a washing machine if wringing out into a bowl instead of a sink. The collapsible type is the more useful in modern houses.

6. *Small baths and bowls* that have been described under steeping.

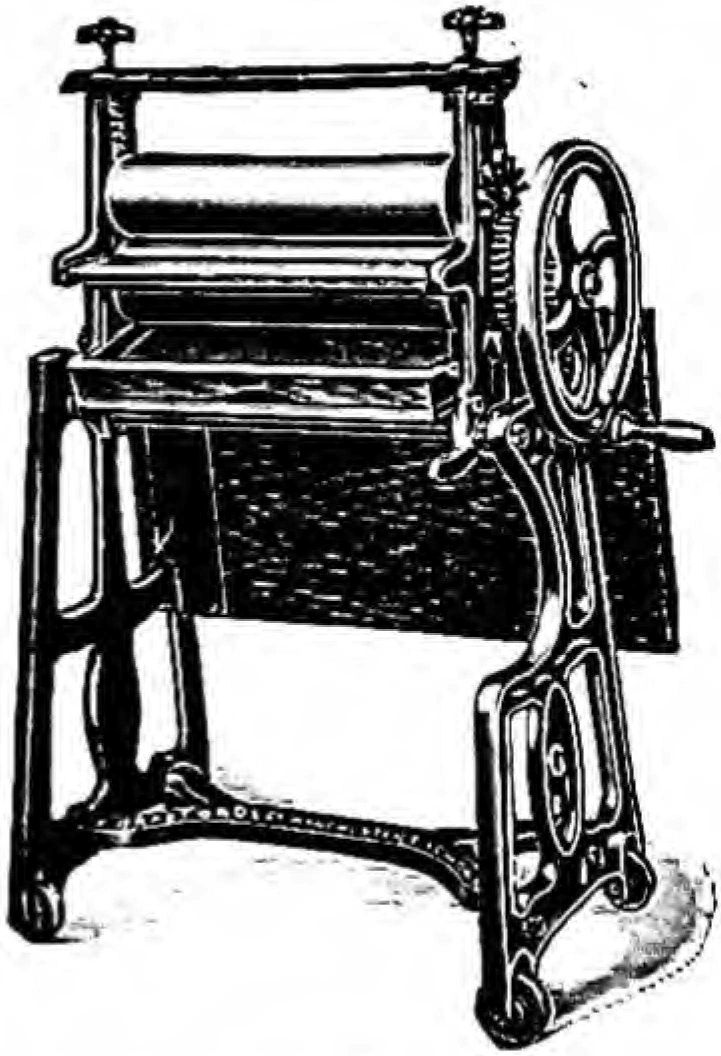
7. *Rubbing board* of corrugated zinc, wood, or glass.

8. *Laundry brush* of soft bristle or rubber.
9. *Small suction washer* of a rustless metal.
10. *Soap dish.*

Wringing. Some type of wringing apparatus is needed in every home. There are many types and sizes of wringing machines, and in consequence a wide range of prices. The initial cost and the space in which to use and store the apparatus are the deciding factors in choice.



CONVERTIBLE TABLE WRINGER



CONVERTIBLE TABLE MANGLE

1. *Wooden-roller mangle.* This consists of a strong metal frame carrying two hard rollers of seasoned sycamore wood. These rollers can be brought close together by some type of tension screw when the mangle is required for use. The release of this screw allows the rollers to keep apart when not in use. The mangle may be worked either by cog wheels or a chain drive. This part of the mechanism should be oiled occasionally to ensure smooth, noiseless running. The upright mangles of this type are suitable for use in a washhouse with the necessary space. This type convertible to a table is suitable for a scullery that has to be adapted for washing, or for a washhouse. The wooden-roller mangle is very durable, and most suitable where there is much heavy work to be done, but it is not suitable for use on garments

with buttons. The rollers and boards should be washed clean, dried after use, and the tension screw released. This helps to keep the rollers in good condition.

2. *Rubber-roller mangle or wringer*. Mangles of the type described already can have rubber rollers instead of wood. Their use is not very general, as the smaller rubber wringer is a more compact piece of apparatus if rubber rollers are desired.

Rubber wringers are compact and convenient pieces of apparatus. There are many designs to suit different positions. The type that fits on to the side of a sink is very useful in all homes; where there are two sinks the wringer should be placed between them. The wringers convertible to a table are useful everywhere because of the space they save.

Rubber wringers are attached to some types of washing machines. These will be hand operated or mechanically driven according to the type of machine. In some wringers the top roller is of a specially soft rubber, so that buttoned garments can be wrung without being damaged.

The advantages of the rubber wringer are that it can be used for buttoned garments, and that it can be used for most of the modern fabrics, particularly strong rayon. It is inadvisable to use a wooden-roller mangle for these purposes.

The rubber rollers should be washed after use, and the tension should be unscrewed. The rubber can be carefully cleaned with a little paraffin or turpentine if it should become greasy. The paraffin or turpentine should not be left in contact with the rubber longer than necessary, because of possible damage to the surface of the rollers.

3. *Hydro-extractors*. These are electrically driven machines. Small size hydro-extractors are attached to some washing machines instead of the wringer. Large hydro-extractors are always separate units, and are used in institutional and power laundries, and some public wash-houses. This apparatus consists of a perforated vulcanized container which revolves inside a metal case. Clothes are packed evenly into the container, the lid is closed, and the machine started. The inner container revolves rapidly on a central pivot and the centrifugal action draws the water from the clothes out through the perforated sides to the outer case, from the base of which it flows into a floor drain. This is a quick method of extracting water from large quantities of clothes. The inner containers are finished so that the clothes cannot be damaged in any way.

Boiling. Some type of boiler is required in any home where any washing of bleached cottons and linens is done. The size and type of boiler will depend upon the amount of washing done, the amount that can be spent upon initial outlay and running cost, and the availability of gas and electricity.

1. *Small zinc boiler,* for use over a gas-ring, or on an oil-stove, or closed range. Cheap yet strong boilers of this kind can be bought from any ironmonger. They are only suitable for small quantities of clothes, but sufficient for the home where all large articles of bed and table linen are sent out to a power laundry.

GAS WASH BOILER

2. *Iron boiler,* heated by a fire. This type of boiler must be used in country districts, where other types of heating are not available. It is gradually being superseded by other types of boilers entailing less work. Its advantage is that it heats water quickly, provided that the fire is properly replenished, and small coal can be used for the fire. Since it is an iron boiler it must be thoroughly dried after use, and kept dry.

3. *Gas-heated boiler.* This is a strong copper boiler with a heavily tinned interior, enclosed in some type of metal case finished so that no cleaning is necessary. A ring of gas jets heats the inside copper boiler. A fume and steam pipe should lead from the boiler outside. This type of boiler is clean and convenient. Modern types are economical in the use of gas, and can have a central spray device that assists in giving a thorough boiling action.

4. *Electric boiler.* See Chapter VIII.

5. *Washing machines that can be used as boilers.* Some modern washing machines with strong copper interiors have a gas-ring underneath. This means that the water for washing can be heated in the machine, and that after washing the water can be changed, and the machine used as a boiler. This saves giving space to two pieces of apparatus in small houses.

6. *Boiler stick and tongs.* A wooden boiler stick or wooden tongs are needed for moving clothes in the boiler, and for removing after

boiling. A small white wooden brush handle is cheap and will serve this purpose quite well.

Outdoor drying:

1. *Clothes cord.* A fixed rustless metal line is convenient when frequent outdoor drying is done. The condition of this type of line should be watched, as iron rust may occur and this will be deposited on the clothes. The line should be rubbed with a damp cloth before being used. A strong hemp line kept on a wooden winder is much more practical. There should be wall hooks or clothes posts to which this can be fixed. Rewind after use and keep in a clean place. It can be boiled occasionally in the soapy water after clothes, and stretched out straight to dry.

2. *Clothes pegs.* These wooden pegs should be kept clean, and stored in a peg bag or box.

3. *Clothes prop.* A wooden prop to adjust the height of the clothes line when heavy articles are being dried.

4. *Clothes basket.* Willow baskets used for carrying clothes.

Indoor drying. Drying indoors is useful in industrial towns and during inclement weather. It makes a very unpleasant atmosphere, and should not be practised unless there is adequate space, accommodation, and ventilation.

1. *Ceiling clothes racks.* These racks should be near an open window where circulating warm air can help evaporation.

These racks are not suitable for drying large or heavy articles; they are very efficient for airing clothes. They should be very securely fixed, and the cords should be watched for the development of weak places where the cord works over the pulley. The wooden laths should be enamelled white, as this makes them easier to keep clean, and prevents wood marks occurring on damp clothes.

2. *Clothes horses.* Many types are available. That which serves the needs of the household best, and stores in little space, should be chosen. The type in which several racks radiate from one spindle and all fold flat is generally useful.

3. *Radial clothes drier.* Many types of radial driers are available. Some kinds have a firm stand from which spokes radiate, others can be clamped on to a shelf or some convenient place over heat. These are useful for drying and airing small articles.

4. *Extending clothes line.* These are braid lines, and only useful for drying small articles. They are enclosed in metal containers which

can be fixed in an inconspicuous position. Unwind the cord to the length required, check, and fix to a hook; rewind into the container after use.

5. *Drying cabinets.* Strong metal cabinets with swinging or sliding clothes racks, and constructed so that the air is heated by gas or electricity. They have a ventilating shaft so that the heated air is kept in motion. Small sized cabinets are quite possible for household use.

6. *Electric drying cabinet.* See Chapter VIII.

Finishing. Apparatus for finishing may be divided into that required for finishing by mangling and by ironing.

By mangling. The wooden-roller mangle described under Wringing is used.

For further notes on the use of a mangle see Chapter X.

By ironing. The ironing apparatus that is required will depend upon the type of finishing that has to be done, the initial cost, and running cost.

Flat Polishing Millinery Goffering Egg Punching	All these irons are heated by a source of heat external to the iron.

The method of heating will depend upon the resources of the household. The fact that heat is applied by some means to the face of the iron necessitates much cleaning to keep it in a good condition for ironing. The particulars given in Chapter X for using flat irons apply to all these types.

1. *Flat irons* vary in size and weight. The small sizes are useful for babies' and children's clothes. The sizes from 3 to 6 are useful for general household ironing. The heavier sizes beyond 6 are necessary if much heavy table linen ironing is done, but this is not probable at the present time as little of this is done in the home, and much large table linen is not used. The number on a flat iron indicates its size, not necessarily its weight, though a No. 3 iron weighs approximately 3 lb. Flat irons are charged by weight; the approximate cost being 4½d. per lb.

2. *Polishing irons* have a convex base. They are used for polishing collars, shirts, chintz.

3. *Millinery irons* have rounded ends to fit them for their particular work.

4. *Goffering irons* are used for finishing frills. They should be kept clean and smooth. Overheating spoils their surface.

5. *Egg irons* should be kept smooth; they will be spoilt by overheating. They are used for drying smocking, close gathering, small sleeves of babies' garments and for bonnets. They should be cleaned after heating, and be tested by drawing a piece of dry cotton cloth over the heated egg. They are used by drawing the back of the material over the heated egg.

FLEXLESS GAS IRON

6. *Punching irons* are small round metal knobs, used for punching or raising the thick parts of lace; and thick embroidery.

7. *Box iron.* This iron is a metal box into which a heated iron bolt or heater is placed. The advantage of this iron is that the metal case can be kept clean, so no cleaning is needed during ironing. Its disadvantages are that much coal is used in the heating of the bolt, and the heat of the iron is very uneven, so the ironing needs much planning.

8. *Charcoal iron.* This iron consists of a metal box in which charcoal burns. Some charcoal has to be heated and placed in the iron, other charcoal packed round it, the iron lid closed, and the draught door at the back left open to allow the charcoal to continue burning and so heat the iron. This type of iron is clean, but it is necessarily large to allow of holding sufficient charcoal to give continued heat, and so is difficult to manipulate.

9. *Methylated-spirit iron.* This is a small light-weight iron, and not practical for general household ironing. Some irons are constructed for use with solid and some with liquid fuel.

10. *Petrol iron.* This is a heavier iron than a methylated-spirit iron, and more possible for household ironing. The petrol is contained in a reservoir at the back of the iron, and percolates to a perforated metal tube in the base of the iron, where it is lighted and gives heat to the base. These irons give continuous heat, but are not to be recommended because of the danger attached to lighted petrol.

11. *Gas iron.* This consists of a metal box heated by a gas flame. The gas is conveyed to the iron by a flexible metal tubing from a gas

fitting, where the flow of the gas is regulated by a tap. These irons are clean, heat is continuous, and easy to regulate, and so time is saved during ironing. Modern types are enamel or chromium plate finish, with a chromium-plated base, and require no cleaning. Flexless gas irons are available; they require a special fitting and two irons. Gas irons vary in weight from the household size of 5 lb. weight to the heavy irons used in power laundries.

12. *Electric iron and calender.* See Chapter VIII.

Apparatus for heating a large number of flat irons. Apparatus for this can be heated by coke, gas, or electricity.

1. Stoves heated by coke vary in size according to the number of irons they are required to heat. They are strongly constructed iron stoves, and prove durable where a number of irons are needed for classwork. They give good drying accommodation, and can be fixed into the centre of a drying cabinet with a sliding drier on each side. Thus they serve a dual purpose at small working cost. Their disadvantages are the amount of work entailed in stoking and cleaning, and the unpleasant heat givén out to those working near, or changing irons.

GAS IRON-HEATER

2. Stoves heated by gas are metal tables or stands on which the irons are placed. These are heated by rows of gas jets underneath, and have a ventilating shaft at the back. They are clean, convenient to use, quick, and efficient in the heating of irons. Some types have a metal shelf beneath for the storage of irons.

3. Electric iron heaters. See Chapter VIII.

Other apparatus for finishing. The ironing table and its requirements are discussed in Chapter X.

Other apparatus that will aid finishing is some type of sleeve board and skirt board. These may be two separate pieces of equipment, or the skirt board may have a sleeve board attached which will swing back when not required.

1. *Sleeve board.* This may be a collapsible wooden board. This

type stores in small space, but is not very firm in use. A firm wooden board with a heavy base, or a metal board, is more satisfactory. The board requires to be padded with flannel, and covered with a well-fitting white cotton cover that keeps taut during use.

G.T.C. Unit Ironing Table

2. *Skirt board.* These vary in style, size, and consequently price. They are all collapsible; some types of boards fit on to the edge of a table having one leg to keep them in position, and they store in little space. The board needs to be padded with felt and have a white cotton cover that keeps taut during use.

3. *Unit ironing table.* This type of ironing table is constructed so that it fits into a shallow cupboard. The width of the board is sufficient for the average household ironing of the present time. It is recommended to have a glove-end cover, which fits well, and keeps taut during use. The cupboard has an asbestos-lined shelf, in which

to store the iron. The ironing board draws out, and is kept steady by a wooden leg attached from the base of the cupboard to a wooden stay and metal clip on the under side of the ironing board. After use it can be slipped back into the cupboard easily, and is kept in place by a metal bar. The cupboard has to be plugged into the wall to ensure firmness. This piece of apparatus is most useful where space has to be economized.

Dry-cleaning apparatus. Recent developments in the production of non-inflammable dry-cleaning solvents have led to the manufacture of apparatus in which these solvents can be used with safety in the home. The apparatus varies in construction, but the main principle is some kind of tumbler or cylinder in which the clothes and the solvent can be revolved. One household model is equipped with a filter through which the used solvent passes and is cleansed.

CHAPTER VIII

ELECTRICAL ENERGY AND ITS APPLICATION TO LAUNDRYWORK

Electrical energy is the most versatile servant of the modern household, and by using electric power in the laundry the housewife will save both time and labour, whilst adding to the efficiency and enjoyment of the work.

All energy may be changed from one form into another. Thus in a steam engine heat is used to produce movement. Electrical energy is most readily convertible. In the household it is changed into heat in an iron, light in a lamp, and mechanical energy in a washing machine. In order to generate electricity it is necessary to start with some source of energy. Water power is often used for this purpose, or the latent energy from fuel.

Generation of electrical energy. In the power station coal is burnt to heat water which turns to steam. This steam is forced under pressure on to turbine blades, which are made to revolve rapidly. Thus high speed rotary motion is produced, and this turns the armature of the dynamo. The dynamo consists essentially of coils of wire on an iron core (the armature) which revolve between the poles of a powerful field-magnet. As the coils revolve they cut the lines of magnetic force between these poles, and this generates the electric current. The electric current is led out of the dynamo by copper wires, which are good conductors of electrical energy.

Direct current. In some cases the current flows from the dynamo and back again always in the same direction. This is known as direct current (D.C.). It is the type of current produced by most private generating plants and some power stations.

Alternating current. The modern big dynamos send out an alternating current (A.C.). This means that the current first comes out of the dynamo from A and returns to B; then a fraction of a second later the direction of the current is reversed and the current flows out from B and returns to A. The advantage of this type of dynamo is that the current is generated more economically and is more readily changed from the high pressure at which it is carried across the country down to the lower pressure suitable for general use. The frequency of the change of direction of the current is stated as so many cycles. The standard frequency of the current is to be A.C. 50 cycles (or 50 changes per second).

The National Grid System. Under this scheme large power stations generating A.C. current are linked together all over the country, and tall pylons support the transmission wires which connect these stations one to another and carry the current to all parts. The high pressure used for the transmission of the current enables large quantities of electricity to be carried in thin wires, and the pressure is changed down to lower voltages by use of transformers in order to supply current to towns and factories.

As yet the uniform standard of supply has not been attained and some places are provided with a D.C. current, and others with A.C. currents of 25, 40, or 100 cycles. The voltage also varies in different areas. It is necessary when buying electrical apparatus to know whether the supply of current to the house is D.C. or A.C.; and if A.C., to know the frequency of the change of direction. The voltage must also be known.

Explanation of electrical terminology:

Circuit. The distribution of electrical energy is in some respects similar to that of water by means of pipes. Pressure is required to drive water through a pipe or current through a wire, and as a large pipe is needed to carry a big volume of water, so is a thick wire for a heavy current. But whereas when one draws water from a tap the flow depends simply on the pressure (or 'head') and the length and size of the pipe between the town reservoir, or the house cistern and that tap, the amount of current through an electric circuit depends on the pressure (or 'volts') and the total length and sizes of all the wires through which it flows—in the dynamo, from the power station to the user's house, in the meter, from the meter to the apparatus in use, in that apparatus itself, and back again to the dynamo in the power station.

Switch. This is a simple contrivance for 'making' or 'breaking' an electric circuit, and may be inserted anywhere in it.

Fuse. A safety device consisting essentially of a thin, easily fusible wire which melts and so automatically breaks the circuit if the current is dangerously strong as a result of what is called 'a short circuit,' i.e. current getting direct or nearly direct from main to main instead of through lamp or apparatus.

Amperes. Volts. The rate of flow of the electric current is measured in amperes, and the pressure sending the current along is measured in volts. Thus when an electric iron is marked 230 V. 2 amps., this means that the current flowing through the iron will measure 2 amperes if the pressure is 230 volts. If the pressure were 200 volts, less current would flow through that iron.

The voltage varies in different areas, and it is necessary to choose an apparatus that is made to work on the voltage of the district. If an apparatus is used on too high a voltage, too much current will be passed through in a given time, and the apparatus may be damaged. If the voltage is too low, too little current will be pushed through, and the result will be inefficient working.

Resistance. The amount of water flowing through a pipe in a given time will be reduced if the length of the pipe is increased or the size lessened, although the pressure remain the same. Also, electric current flows more easily through a short wire than a long one, and through a thick wire than a thin. The hindrance to the rate of flow is known as the resistance, and works against the voltage. It is measured in ohms. Ohm's law states that the current flowing depends on the pressure divided by the resistance, or that

$$C=\frac{V}{R}, \text{ where } \begin{cases} C=\text{current in amperes;} \\ V=\text{voltage in volts;} \\ R=\text{resistance in ohms.} \end{cases}$$

Watt. When 1 ampere of current flows through an electrical apparatus with a pressure of 1 volt behind it the work done by the apparatus is known as 1 watt. Thus the power used in an electrical machine is found by multiplying the number of volts by the number of amperes used.

$$W=V\times C$$

Thus an electric iron 250 V. and 2 amps. will use 500 watts.

Board of Trade unit. An electric meter registers the number of Board of Trade units of electrical energy consumed. One B.O.T. unit is consumed when 1,000-watt apparatus is used for one hour.

A 500-watt iron may be used for two hours before a unit of electrical energy is consumed.

A 3,000-watt water heater uses 3 units an hour if used at 'high' all the time.

Loading. The number of watts used by an apparatus is referred to as its 'loading.'

Cost. The price of the 'unit' varies in different areas. The charge for electrical energy may be based on various systems.

In one, a sum representing about 12 per cent of the rateable value of the house is charged per annum, and the current consumed is charged at a very low price (perhaps 1d. a unit) for lighting and for heating.

In another, two meters are installed, one to measure the current used for lighting and the other to measure current used for heating and power. The charge per unit for lighting will be much higher than that

for power, and both are sold at a cheaper rate if used in large quantities.

The electrical apparatus now available for laundrywork has changed the aspect of this branch of household work, and it is well worth while for the housewife to consider the ultimate economy in spending money on electrical laundry equipment.

Earthing. It is necessary to emphasize the fact that all laundry apparatus must be properly 'earthed.' This is to ensure that there shall be little difference of potential between the apparatus and the person handling it. The earth is a conductor, and if any two points of an electric circuit at different potential are in connection with the earth there will be current between them via the earth. All current-bearing wires in use in the laundry are carefully insulated from earth and from everything a person can touch; but not only may a break-down of insulation occur at any time and apparatus become 'live,' but there is also always 'leakage,' for all things and persons stand more or less directly on the earth. In the laundry the danger is greatly increased on account of the moisture. The metal work of all apparatus should therefore be well 'earthed,' as by being connected to town-supply water-pipes. Also all switches, fuse-boxes, and other fittings must have porcelain, not metal, covers and handles.

Conductors. Conductors are things that allow electricity to pass through easily, e.g. metals and water if slightly impure. Copper is the best conductor cheap enough for general use. Water is a great source of 'leakage.' The human body is a poor conductor.

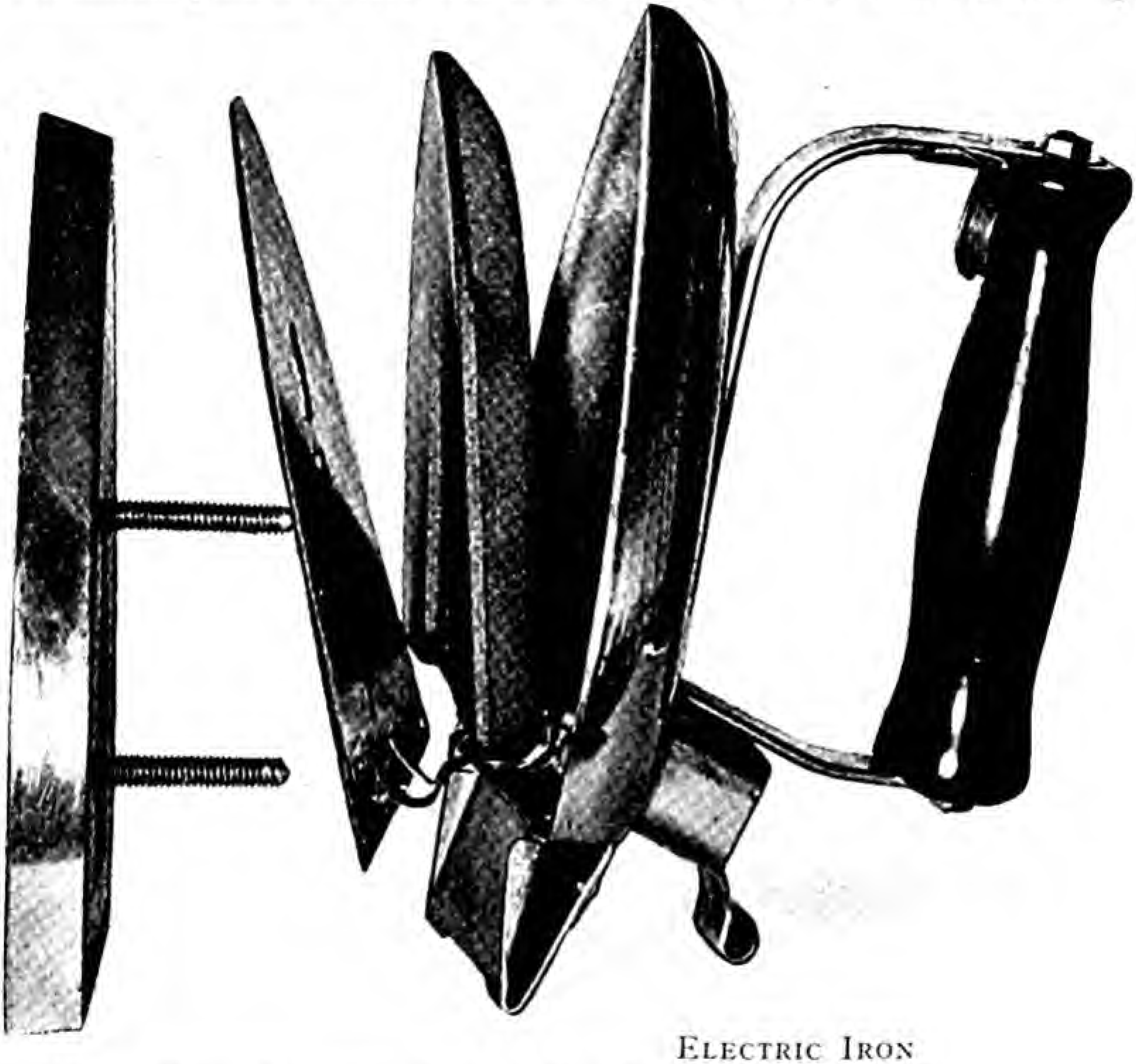
Insulators. Insulators do not allow electricity to pass through readily; such are air, mica, porcelain, glass, rubber, cotton, silk, wool, wood, especially when they are dry.

Choice and use of electrical apparatus:

1. Choose apparatus of suitable size for requirements.
2. Apparatus must be for correct voltage.
3. The wires bringing current to the house must be such that they will carry the load. (A thicker wire is needed to carry more electrical energy at the same pressure.)
4. All apparatus must be properly earthed.
5. Never adjust the apparatus while the current is 'on.' It is safer to turn off the main switch near the meter and so sever connection with the power station.
6. Avoid handling electrical equipment with damp hands.
7. Have any defect attended to at once.
8. Find out by experience the maximum efficiency of the apparatus for the minimum consumption of electrical energy.

Application of electrical energy to Laundrywork:

Electric iron. This is the piece of electrical apparatus for laundrywork that is most generally used by housewives. Modern irons are of good design and balance; they can be obtained in different weights according to the type of work they are required to do; they have a nickel- or chromium-plated surface which is rustless, hence entails no cleaning.



ELECTRIC IRON

The outline of construction of the electric iron is briefly:

1. A solid metal base with a bright-plated ironing surface. This surface is smooth, and so lends ease to ironing. Irons with a chromium-plated surface give lasting wear. The bright surface reduces loss of heat by radiation, hence this type of iron is pleasanter to use than any type of black iron, e.g. the flat iron, where radiation to the worker gives unpleasant heat. Thus an electric iron is difficult to test by holding over the back of the hand, the method advised for flat irons. A better method for the amateur is to apply a drop of water, or moistened finger-tip, to the face of the iron.

2. The element is placed immediately above the metal base. It consists of a long thin wire which has a high resistance. One type of wire used for this is nichrome, an alloy of nickel, chromium, iron, and manganese. This wire is wrapped round a platform of mica, and is protected on each side by sheets of mica, which insulate it from the other metal of the iron. The ends of this wire are connected to metal poles at the heel-end of the element.

3. A press plate which covers the element and adds weight to the iron. Some types have a sheet of asbestos between the element and the press plate. This helps to prevent heat rising to the iron shield.

4. The cover and handle which are screwed down over the press plate and element to pillars which come up from the ironing base. The handle consists of a non-conducting material—wood, and usually has a thumb rest; the use of this helps in giving pressure during ironing. At the heel of the cover is a shield containing two metal contact pins for the flex connection. These pins connect through the cover to the two metal poles at the heel-end of the element.

The iron is connected to the electric circuit by means of a flex consisting of fine wires well insulated with rubber and sometimes covered with silk or cotton. This flex has a connection at one end, which fits into the shield and makes contact with the contact pins at the heel of the iron. At the other end of the flex there is a connection for fitting into either a wall plug or a lamp adaptor.

The iron heats, when the switch is on, by the current passing from the main through the wall plug or lamp adaptor, through the flex and connection to the contact pins at the heel of the iron. These pins are in contact with the metal poles at the ends of the element. The thinness of the wire of the element, and its great length, set up a resistance to the flow of the current, and the electrical energy is changed to heat energy, causing the element to become red hot. This heat passes by conduction to the ironing surface.

Electric irons are available with a thermostatic control. This consists of some type of heat regulator fixed into the iron, by means of which the current switches off when ironing temperature is reached, and automatically switches on again as the iron cools. In some cases a metal spring inside the iron expands with the heat and breaks the circuit, which is completed again when the spring cools. This saves time to the ironer, who does not have to wait for the iron to reheat. The iron remains at the same temperature whether being used or not, so there is no risk of damage to the iron by overheating. Some irons have control switches on the iron so that heat can be

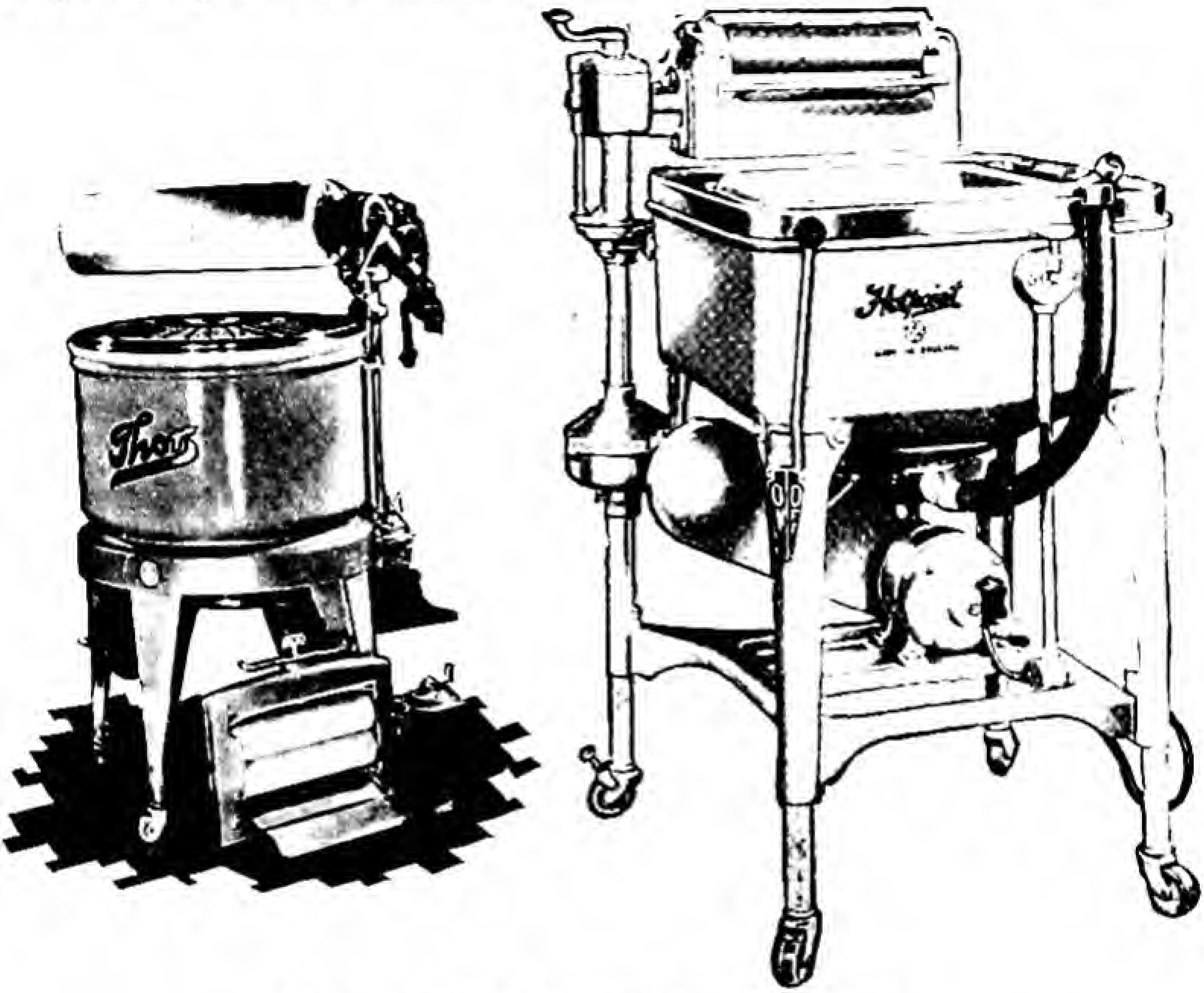
regulated for different fabrics, others are specially constructed to serve different purposes, such as repleating, and ironing round buttons.

The housewife should examine the length of guarantee given with an electric iron before deciding on any particular type. Those of simple construction are guaranteed for a certain number of years. This means that the manufacturer will replace the element if it is found faulty within the named period, provided there is proof that the iron has been properly used the whole time. Irons thermostatically controlled, and adapted for special purposes, generally cost more in the initial outlay, and have a much shorter period of guarantee.

Flexless electric irons are available; they have the advantage of the ease of working without interference from the flex. They are found very satisfactory in commercial workrooms. They need a special fitment, each having two irons. The irons fit into sockets, and when in place the electric circuit is completed. On removal of an iron the two live ends are exposed, and any conductor, e.g. metal, or finger, placed on them will complete the circuit. Thus it is necessary to add a warning in regard to the place of installation of this fitment, and each fitment should have a pilot light, so that it is known when the current is passing through. The precaution should be taken of switching off the current before removing an iron.

Electric irons should be used carefully. Nothing should be done that will damage the contact pins or the element. The connection should fix firmly on to the contact pins, so that proper contact is made during ironing. The flex should be free of loops or kinks during use, and no strain should be placed on it; or the fine wires may break near the connection, and cause a short circuit, the result of which will be the burning out of the flex at this point. This is less likely to happen if the flex is arranged so that it comes from above the worker. It is very unwise to have the plug for an electric iron so low that the flex comes from below the worker. If this last condition cannot be avoided the flex should be long enough to allow of its being placed over a hook higher than the worker, then coming down from the hook to hand level. An alternative is to have a flex holder clamped on to the edge of the ironing table. The surface of a modern electric iron is such that it keeps clean with little attention. The current should be switched on, when any cleansing is needed, the iron heated slightly, then the current switched off. Clean with wax or oil, and good rubbing. Avoid the use of any abrasive powder if possible, and when any such powder must be used apply sparingly along with the oil, using a powder free from coarse grit. Clean off thoroughly with a duster.

Quick calculation of running cost of an electric iron. From previous information it will be seen that electrical apparatus uses a definite quantity of electrical energy in a given time. Thus a 500-watt iron always uses 500 watts in one hour if switched on the whole time.



TWO ELECTRIC WASHING MACHINES

Since one unit is consumed when 1,000 watts are used for one hour this iron can be used for two hours for the consumption of one unit.

∴ the cost of running the iron will be

$$\frac{\text{the wattage} \times \text{the number of hours used} \times \text{cost per unit}}{1000}$$

∴ if one unit costs 2d., the cost per hour for running this iron will be

$$\frac{500 \times 1 \times 2\text{d.}}{1000} = 1\text{d. an hour}$$

Electric washing machine. The application of electrical energy to the operating of a washing machine has revolutionized the washing of clothes. A low-powered motor forms part of the construction of

these machines. This motor works a piece of mechanical cleansing apparatus which varies in design and size according to the machine. Examples of different types are given in Chapter VI. Electric washers have some type of wringing apparatus attached and worked by the same motor. All machines are constructed so that the mechanism is easily controlled by the movement of a handle or lever. They are made of metals that will not damage any fabric, and the metals are finished in various ways so that no cleaning is needed. All these machines are of sound construction, easy to handle, and reliable in use. They effect a saving of time and energy, especially when placed in correct relation to an overhead tap and a floor drain.

The motor power used by most household sizes is $\frac{1}{4}$ H.P. Since

$$1 \text{ H.P.} = 746 \text{ watts, a motor of } \tfrac{1}{4} \text{ H.P. uses } \frac{746}{4} \text{ watts per hour.}$$

$\therefore$ cost of running washing machine for 1 hour if 1 unit costs 2d. will be

$$\frac{746}{4} \times \frac{2\text{d.}}{1000} = \tfrac{3}{8}\text{d.}$$

Some types of machines can have a small-sized calender fixed in place of the wringer for finishing. This works on the same spindle as the wringer, but the calender consists of two parts:

1. The roller, which revolves when connected to the motor that works the cleansing apparatus, and the wringer.

2. A metal shield carrying a heating element.

Calender—Electrically Heated and Driven

Since it requires more current to heat the shield than to drive the motor, the shield must have a separate plug and flex as the heat and

motion are required together. The shield of a household calender of this size with a loading of 1,250 watts, would cost if switched on at 'full' for 1 hour, at 2d. a unit.

$$\frac{1250\times 1\times 2\text{d.}}{1000}=2\tfrac{1}{2}\text{d.}$$

The total cost of running for 1 hour would be:

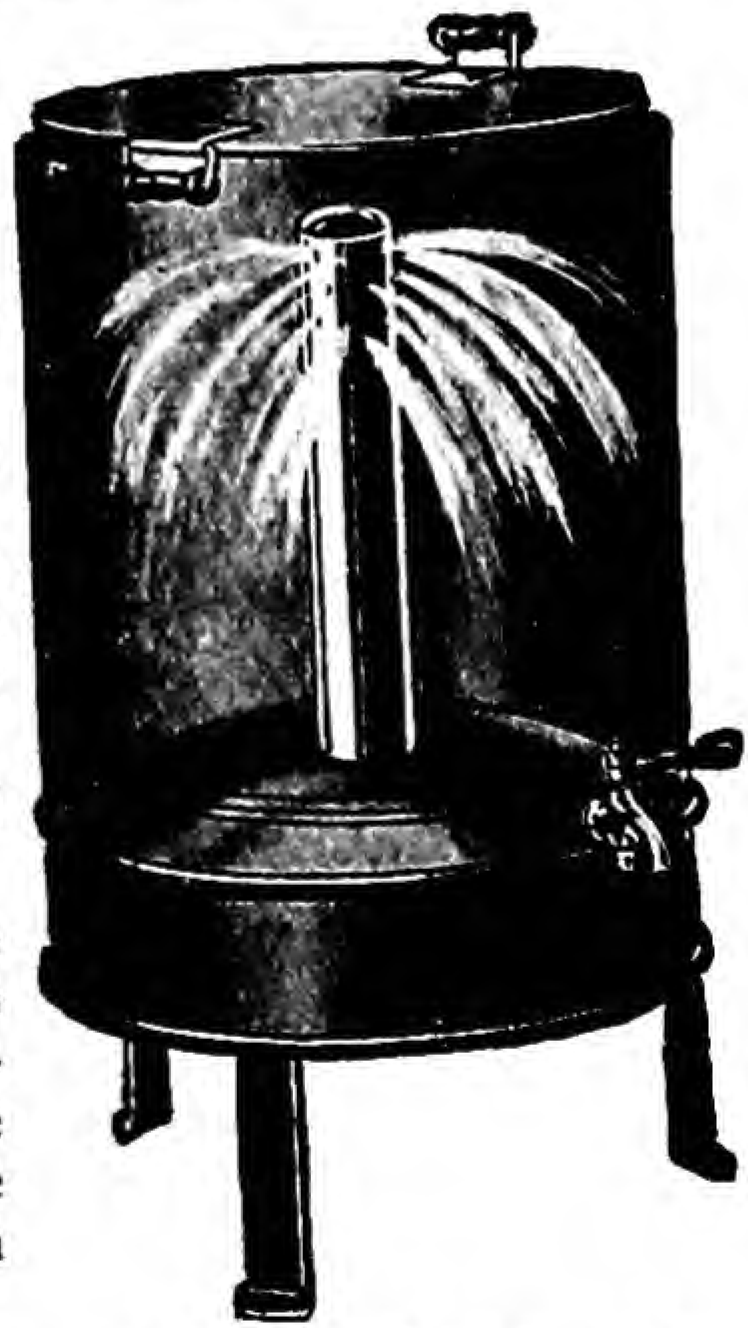
$2\frac{1}{2}$d. per hour for heating
$\frac{3}{8}$d. „ motor power

∴ total running cost of calender = 3d. per hour approximately.

Electric calender or ironer. This has been described above with the electric washing machine. Other sizes of calenders are available as well as the small ones which can be attached to washing machines. A size larger can be used on its own stand on a table, whilst those still larger have their own individual stands.

For the method of using calender see Chapter X.

Electric wash boiler. This is a strong metal boiler, generally consisting of a steel case with a well-tinned copper container for the clothes. The case can be obtained in many types of finish that require no cleaning.



Electric Wash Boiler

The method of heating is one of two types:

1. *Clamped elements.* These are heating elements securely fixed to the underside of the clothes container. This does not necessitate any perforation of the base of the container, consequently leakage from metal joints is eliminated.

2. *Immersion heater.* This consists of an immersion heating element fixed into a special compartment across the centre of the base of the inner container. It is lower than the base, and is covered with a perforated grid to prevent clothes being damaged by coming in contact with the element.

Many electric boilers have a spray device that consists of a rustless metal tube, perforated at the top, mounted on a disk fitting the base of the inner container. In boiling, the soapy water rises up this tube and sprays over the clothes. This gives a very thorough boiling action, and is suitable for use with the soaps and soap powders where makers advise cleansing by boiling (see Chapter VI).

ELECTRIC DRYING CABINET

A wash boiler is required to heat a large quantity of water quickly, so the heating element must carry a heavy load. Example:

A 10-gallon boiler will have a 3-kilowatt element. This means that the element will use 3 units in 1 hour.

The running cost of this boiler at 'high' with 1 unit costing 2d. will be

$$\frac{3000 \times 2}{1000} = 6\text{d. per hour.}$$

This type of boiler must have some means of reducing the heat when

the water has reached boiling point, so that it can be kept boiling as long as required. This is done by means of a 3-heat control switch. The connecting wires to the element through this switch are so arranged that it can be turned to 'medium' or 'low' when less heat is required, as well as to 'high' for full heat. A 3-kilowatt element uses 3 units per hour when it is placed at 'high' the whole time. It will use less current at 'medium' or 'low.'

A disadvantage of this type of boiler has been the possibility of it boiling dry, or of the element being switched on by accident when the boiler is dry and causing damage. The latest types of boilers have an automatic safety device that can be fixed at little extra cost. This switches off the supply of current should it be switched on while the boiler is empty.

In fixing a boiler of this type it is very necessary to have it properly earthed as it carries an element with a very heavy loading. A pilot light should be connected with the switch to give warning when heating is 'ON.' The precaution should be taken of switching 'OFF' before the boiler lid is touched during use.

Electric drying cabinet. This is a strongly constructed steel cabinet, with all metals finished, so that no cleaning is required. The interior of the cabinet is lined with insulating material, and has a swinging or sliding clothes rack. The heating elements are in the bottom of the cabinet, and will vary with its size. The cabinet illustrated has a 6-kilowatt heater; it has also a constant heater of 250 watts to assist circulation of the air. The element can be thermostatically controlled so that the temperature cannot rise beyond that suitable for drying clothes.

Electric iron heater. This consists of a strong steel table in which a heating element is fixed. This is controlled by a 3-heat switch, and has a pilot light. This type of heater is used for heating flat irons, but as it uses 7 kilowatts per hour it would be expensive to run, and individual electric irons would probably be a more satisfactory investment.

CHAPTER IX

TREATMENT OF COTTON AND LINEN FABRICS

Household cloths. These can be separated into kitchen cloths, dusters, polishing cloths.

Kitchen cloths and dusters can be washed by any of the methods of friction washing. They will cleanse easily if treated with soap which contains a grease solvent. Many soaps of this type are available. An alternative method is the use of a washing powder. These generally have a strong cleansing action, but their continued use may lead to the fabric being damaged through the presence of excess washing soda. Polishing cloths, very soiled, and greasy household cloths may be cleansed by the same methods, or they may be given a paraffin wash in the wash boiler after other boiling is finished.

Paraffin wash.

Proportion:

1 gallon hot water.
½ oz. washing soda.
1 oz. grated soap, preferably a soap containing a grease solvent.
1 tablespoonful paraffin.

Method. Place washing soda, soap, and water in a bucket or laundry pan. Heat till the water reaches boiling point. Remove from the heat, add the paraffin, and stir. This precaution is necessary owing to the inflammability of paraffin. Place cloths in this, return to the heat, and boil quickly for ½ hour. Move cloths round occasionally. Remove into a sink, and rinse several times with hot water. Very greasy cloths may need a hot washing-soda rinse, with scrubbing brush used on persistent surface dirt. Dry outside, as fresh air helps to remove the smell of paraffin. This type of wash can be carried out for a larger quantity of things in a wash boiler, and is very efficient for cleansing mechanics' overalls.

Cleansing action. The paraffin with the soap has the property of lessening surface tension of grease globules, and keeping them in a fine state of suspension, so that when grease is in suspension the dirt is removed from the fabric. This removal is effected by the movement of the articles in the water and by the passing of the boiling water through the fabric.

A paraffin wash saves handling of very greasy cloths, but it leaves a disagreeable odour in the fabric, and is not economical in materials or fuel.

Bleached cotton and linen fabrics:

Sorting. Articles of these fabrics are sorted and placed together, then they are divided according to texture and use in the following way:

Table linen
Bed linen
Personal garments
Handkerchiefs

All articles of one group are kept together throughout the washing process.

Mending. Table linen is always mended before washing. Thin places in sheets and towels can be mended, because holes in large and heavy articles generally increase in size during washing.

Stain removal. See Stain Removal Chart, Chapter V.

Known stains should have their special treatment before material is steeped, e.g. iron rust, ink.

Steeping. Steep for 24 hours in cold water. Never steep longer in the same water, as bacterial action takes place, the water sours, and fabric may be damaged. Change the steeping water after 24 hours if the clothes cannot be washed.

A shorter steep is effective when a long steep is not possible.

A warm steep with the addition of washing soda is effective for articles very badly soiled with greasy dirt. The emulsifying action of the washing soda on grease begins cleansing by loosening the dirt.

The groups of clothes should be steeped separately. Handkerchiefs are always steeped separately with salt in the water; proportion, 1 tablespoonful to 1 quart water. Handkerchiefs used during illness should be steeped with a small amount of disinfectant in the water.

The action of steeping is:

1. It wets the fabric.

2. Soluble stains and protein stains are brought into solution.
3. Non-fixed dirt is removed from the fabric by the action of pedesis.
4. Starch from previous laundering is softened.

Cleansing. Wring from the steeping water. The use of a rubber wringer or a mangle facilitates this operation, and saves much time and energy.

The most suitable method of cleansing will be governed by:

1. The type of fabric.
2. The type of article.
3. The amount and kind of dirt present.
4. Number of articles to be cleansed.

All methods of cleansing are suitable for bleached cottons and linens, hot water and soap or reliable soap powders should be used as the cleansing agents. See Chapter VI for Methods of Cleansing.

Rinsing. Rinse in warm water to remove all soiled soapy water.

Boiling. All bleached cotton and linen is boiled to help to keep it a white colour, especially when out-door drying is not possible. The water in the boiler must be softened before the clothes are put into it. Soap and soda should be used for this, the quantity depending upon the hardness of the water. Soda alone should not be used, as it damages fabric, and when used with soap should be put into the boiler first to react with the hardness, and prevent any free soda being left in the water. There should be no scum of calcium stearate left on the water in hard-water districts, when the clothes are put into the boiler, as this calcium stearate will boil into the mesh of the fabric, cause discoloration, and will damage the threads of the fabric. Place the clothes in the boiler before the water reaches boiling point, and leave until the water has boiled for 15 minutes. It is important that the water should boil through the fabric, therefore the boiler must not be too well packed with clothes. The central spray that is supplied with some boilers gives a very efficient boiling action.

When outdoor drying is possible clothes need not be boiled every wash, and when drying in sunshine is possible boiling is seldom necessary.

Rinsing. Remove from the boiler by using a boiler stick or tongs. Rinse in hot water to remove the soapy water from boiling. The hot water keeps the soap in solution and ensures its complete removal from the fabric. Rinse in cold waters. This cold rinsing is a most important factor in retaining the whiteness of bleached fabrics.

Blueing. Ultramarine blue is the usual household blue. It is bought in cubes; the cube is tied in a piece of thick material to prevent the too free passage of the particles of blue into the water. Squeeze the blue bag in cold water until a pale-blue colour results. Blue water should be used when freshly made; if it has been allowed to stand it should be stirred, as the blue particles settle out on to the sides of the bowl, causing a blue stain on any fabric that touches them. Shake out the article, dip into the blue water, and blue evenly. Wring by hand or machine.

Starching. The starching of cottons and linens is governed by the type of fabric. Many modern fabrics are not starched. Plain weave unmercerized fabrics are the type usually starched. Mercerized fabrics, fabrics of a fancy weave, and all knitted cottons require to keep their original softness, hence they are not stiffened. The object in starching fabric is to improve its appearance, and give it a glossy surface that will not soil easily. Thin fabrics can be improved in this way by the use of a stiff starch solution. Bleached cotton and linen can be blued and starched in one operation; this effects a saving of time. The starch solution is made up to the required strength, the blue is squeezed carefully into it. This is a method used for table linen, but its disadvantage is that it restricts the use of the starch to bleached articles only, and these are in the minority at the present time.

Articles must be wrung before being starched, or the moisture they hold will dilute the starch solution. Squeeze the fabric well in the starch solution, so that the stiffening will be even. Wring out as much moisture as possible. Hang up and dry completely. Unless the starch solution has dried into the fabric the surface will be sticky, and cause difficulty in ironing. Redamping a dry-starched article avoids this condition. Damp evenly and roll down tightly for ½ hour before ironing. Starched articles must not be left damp for any length of time or mildew will develop.

Recipes for starch making are given in Chapter IV.

Wringing. Fold articles, and pass through wringer or mangle to remove as much moisture as possible. This quickens the drying process.

Drying. Outdoor drying should be practised when possible, as this helps to retain the whiteness of bleached articles, and gives a certain freshness to clothes. An ideal drying day is one on which the air is warm, dry, and moving, so that the moisture will evaporate from the clothes quickly. Sunshine is an advantage in the drying of bleached

cottons and linens because of the bleaching that it will effect. It is a disadvantage for all other fabrics and for coloured articles. Too much wind will cause undue movement, and possible tearing of clothes. Frosty air is of no avail for drying, but will act as a bleach for cottons and linens.

Points regarding the hanging of clothes for drying are:

Hang by the thickest part.

Hang with the strongest threads of the material downwards. These are the warp threads, and usually run lengthways; hanging in this way helps to keep garments a good shape.

Take a firm grip of the material with the peg.

All articles must be sufficiently well pegged to the line to keep them secure.

Discoloration. The chief discolorations on these fabrics are:

1. Yellowness due to use, wear, excess use of alkali in cleansing processes.

2. Greyness due to lime soaps penetrating the fabric, or to the excessive use of blue.

3. Inefficient cleansing.

These can be avoided by:

1. Careful use of alkali during cleansing processes to avoid yellowness.

2. Use of properly softened water on which there is no scum of calcium soap, to avoid greyness.

3. Thorough rinsings after boiling.

4. Correct use of blue.

5. Outside drying.

Unbleached cotton and linen fabrics. These may be divided into household cloths and table linen.

The following differences are made in treatment from that given to bleached cotton and linen:

No steeping excepting for very soiled articles.

Stain-removal agents used in solution always, and bleaches used very carefully.

Temperature of washing water lower than for bleached fabric.

No boiling excepting for household cloths.

No blueing.

Starch to be slightly thinner than for bleached table linen, as the unbleached fabric is usually thicker.

Coloured cotton and linen fabrics:

Colour testing. The stability of colour in all printed and patterned fabrics irrespective of fibre can be tested in the following way:

Wet a small piece of the fabric or an unimportant part of a garment in cold water. Place this between two pieces of dry white cotton material. Apply a hot iron, and give a good press. The sudden application of heat will cause any unstable dye to mark off on to the white cloths. This is a sure indication that washing will spoil the pattern. If washing must be done to such materials it should be carried out quickly in cool soapy waters, followed by thorough rinsing and immediate finishing. Dry cleaning will always affect the colour of such materials less than washing.

Modern dyed and printed cottons and linens are generally of fast dyes. Certain precautions should be taken throughout their treatment as colours may be dulled by repeated washings.

Colour may be affected by any of the following:

1. Long immersion in water.
2. Heat.
3. Contact with strong alkali.
4. Friction.

The important points throughout laundry treatment are:

No steeping even for very soiled fabric unless guaranteed fast colour.

Stain removal of known stains by their specific reagent used in solution. Bleaches very carefully used if necessary.

The washing carried out quickly, one article washed, rinsed, and put up to dry at once. All washing and rinsing waters prepared before washing is started.

The temperature of washing waters to be 100°–110° F.

A permanent lather to be made with a soap solution made with soap free from excess alkali, or with a pure soap flake.

Cleanse by kneading and squeezing, or suction washing.

Rinse in warm water, then in cold waters. The last rinse can have acetic acid added, 1 table spoonful to 1 gallon; or household vinegar, 2 tablespoonfuls to 1 gallon. This would only be used on materials where the colour had moved (colour bleeding) during the washing process.

Boiling-water starch, diluted according to the requirement of the fabric, should be used for stiffening.

Remove as much moisture as possible so that the clothes will dry

quickly, and there will be no possibility of colour passing along fibres through excess of moisture.

Dry in the shade to prevent any sunshine bleaching occurring.

Finish according to the type of fabric.

Cretonne and chintz. These are patterned cotton and linen fabrics that are used for household furnishings. The stability of the colour of these fabrics to washing depends upon the type of fabric and the method by which the pattern is printed. This stability of colour can be tested as described under coloured cottons and linens.

The laundry treatment depends on the stability of the dye, and the size of the articles. Large articles must always be treated like coloured cottons, unless they are of uncertain dye, in which case they should be dry cleaned. The cleansing of large articles should be done by a suitable method, e.g. suction washing, or the use of a washing machine. The temperature of the water should be such that it will cleanse without affecting colour; if colour begins to leave the fabric reduce the temperature of the water, and quicken the cleansing operations.

Use a pure soap in solution, or a soap flake, or washing powder that contains no excess alkali.

Starching will depend upon the type and thickness of the fabric.

Cretonne chair covers should be shaken, then brushed round the piping cord before being wetted. Suitable apparatus should be used for washing; the use of a washing machine saves labour for this work. After thorough rinsing, boiling-water starch should be used for stiffening; the proportion will depend upon the thickness of the cretonne. Dry, damp very evenly, and roll down for quite ½ hour before ironing. Iron all turnings, and double parts on the wrong side. Iron the whole of the covers on the right side, working along each side of any piping cord with the side of the iron. Turn, and work along each side of the piping cord on the wrong side of the cover. Press any pleats in position very heavily. A sleeve board and a skirt board facilitate the ironing of the parts of these covers that are difficult to reach. Air very thoroughly before replacing.

Chintz is a thinner fabric than cretonne, and not much used at the present time. It requires to be very stiff and usually has a glazed surface. It should be stiffened with boiling-water starch, into which some wax has been shredded, diluted to 1 : 1 strength and allowed to cool. The chintz should be starched, dried, damped, ironed on the

right side, then glazed with a polishing iron. This work will be undertaken by power laundries and some dry-cleaning firms if articles should be too large to be dealt with by the housewife.

Bran wash: Small articles of fabrics of uncertain dye, and pieces of art needlework, can be treated by bran washing, because bran water does not affect colours.

Proportion. ½ pint bran to 2 quarts water.

Method. Put the bran and water into a pan, heat to boiling point, and simmer for ½ hour. Pass through a strainer lined with a piece of muslin. Use this liquid when it has cooled to the correct temperature (100° F.) for both washing and rinsing. Soap solution can be added to it for washing very soiled articles. The bran water is a colloidal solution containing a small amount of starch and gluten. It has a slightly alkaline reaction, and cleanses by holding dirt particles in suspension. The object in making bran water is to obtain a thorough extraction from the bran into the water. This liquid will hold non-greasy dirt in suspension, but will not affect greasy dirt, hence the need for the addition of soap for very soiled articles. Articles washed by this method can be stiffened by squeezing in clean bran water, after which they should be half dried, and ironed or pressed according to requirements of each article.

Knitted cotton and cellular cotton. This is a soft pliable fabric and has been used mostly for undergarments. It is being used now for a greater variety of garments in mercerized threads and fancy knitted patterns. It is a comfortable fabric to wear, and is of good durability. It is generally cream or coloured, seldom white; this makes it easy to launder. It requires no boiling, or starching, and very little finishing, hence it effects a saving of work to the housewife.

The cellular type of fabric will have the same laundry treatment, but it does not stretch like knitted cottons.

The laundry treatment is similar to that of coloured cottons. It is generally a thick material and holds much moisture; so very thorough wringing is necessary after washing, or the fabric because of its pliable nature will stretch out of shape with the weight of water during drying. Shake and stretch into shape after wringing, then little finishing will be needed. Hang up to dry by the thickest parts. Press with a moderately hot iron when almost dry.

Velveteen. Velveteen is a pile fabric. It was formerly made of cotton, but modern velveteen may be a mixture of cotton and rayon.

All velveteen will wash satisfactorily whether it is of a plain colour or patterned.

The laundry treatment is similar to that of coloured cottons with the following exceptions:

The cleansing process should be kneading rather than squeezing, and the garment lifted from one water to the next without any squeezing; alternative method, use of a hand suction washer.

The rinsing should be very thorough. A final acetic acid rinse can be given if it is necessary to revive colour.

Hang up to drip from the final rinse; do not wring or squeeze.

Dry in a warm atmosphere; the steam during drying raises the pile.

Very little finishing will be necessary. Creases can be removed by steam pressing from the back of the material. Place damp muslin over the material. Hold a moderately hot iron over it so that steam is formed, not allowing the weight of the iron to press on the velveteen and flatten the pile. An alternative method is to steam over the face a moderately hot iron standing on its heel. Draw the back of the slightly damp velveteen across the face of the iron. This is practicable only for small articles.

Flannelette. This is a soft cotton fabric woven so that it resembles wool in texture and appearance. Its entire surface has projections of minute threads. These give the appearance of wool, also its property of forming a non-conducting layer of air, but they increase its inflammability. This inflammability is the great drawback to the use of flannelette, and has led to various methods being tried to load or ' fire-proof ' the material.

The most satisfactory methods of fire-proofing all depend on impregnating the fabric with solutions of salts that prevent burning.

Ammonium salts act in two ways:

(*a*) By releasing ammonia gas, which forms a non-combustible layer round the fabric.

(*b*) By melting on the surface, thus protecting material from contact with flame.

Borax. Boric acid treatment.[1] A solution containing 30 per cent boric acid and 70 per cent borax is made up at 50° C. This is cooled to 40° C., and the material immersed in it from 15 minutes to 1 hour

[1] This method of fire-proofing was developed by Dr. J. E. Ramsbottom and Mr. A. W. Snoad of the Royal Aircraft Establishment, Farnborough, in the course of an investigation for the Fabrics Co-ordinating Research Committee of the Department of Scientific and Industrial Research.

according to the ease with which it penetrates the fabric. The material is squeezed out well, and dried. The mixture forms a non-crystalline, almost invisible layer on the surface of the fabric. This melts on heating to form a glassy covering which does not burn.

Flannelette is treated like knitted cottons in laundering. Any fire-proofing substance will be washed out of the fabric, so the treatment must be repeated after each washing. This will be done after the last rinse. Wring thoroughly as flannelette holds much moisture, dry, and finish when almost dry by ironing with a moderately hot iron.

Organdie. This is a cotton material woven from a good quality combed yarn. A long staple cotton is used for the yarn, which is spun with many twists, forming a hard-spun yarn. This, along with the finishing process, produces a stiff transparent material. Organdies may be white or coloured; recently fancy weaves have been introduced. It is washed like coloured cotton, and generally does not require any stiffening, as it becomes stiff when ironed damp. Dilute boiling-water starch is used when any stiffening is found necessary. Organdie dries quickly, so should be ironed after squeezing from the last rinse, and beating in a cloth. Starched organdie should be dried, and redamped. Keep the unironed part covered with a damp cloth when ironing dresses. Iron to dryness on right or wrong side according to surface-finish required on the fabric.

CHAPTER X

METHODS OF FINISHING

Finishing by use of a mangle. This method of finishing is suitable for all flat articles, e.g. bed linen, household cloths. It can be used as a quick household finish for plain garments of any fabric that it will not damage, e.g. coloured cotton overalls, children's plain cotton frocks.

Finish by mangling is being gradually superseded by quicker methods. Power laundries have introduced economical household services, in which the finishing of flat articles is done by multi-roll ironers or calenders. These services are charged at a specially low rate, and save the housewife much arduous mangling. A household alternative is a small-sized calender, which can be attached to an electric washer in place of the wringer, or a larger calender on an individual stand. Both of these are electrically driven, and have an electrically heated metal ironing shield.

Condition of clothes for mangling. This may be:

1. *Half dry.* It is most practical for the housewife to take the clothes down when they are half dry, then fold, mangle, and air them.
2. *Dry.* Clothes that are dry must be evenly damped before being folded.

Method of damping. Warm or cold water may be used, warm water spreads more quickly.

Spread the clothes on a clean table.

Damp hems, sprinkle evenly by dipping the hand into the water, opening out the fingers, and shaking the drops from the finger tips.

Small articles, e.g. handkerchiefs, can be damped most quickly by damping some completely, and folding damp and dry ones alternately.

Metal sprinklers that fit into a bottle filled with water can be used for sprinkling clothes.

Stretch the damp article into shape; fibres can be stretched only when damp.

Method of folding for mangling. The article must be right side out. Fold with the warp threads as many times as neccessary according to the width of the article.

Fold with the weft threads once or twice according to size of the article.

Fold evenly and as flat as possible.

Methods of folding household articles:

Huckaback towel and kitchen cloth. 2 warp folds, 1 weft fold.

Turkish towel. Mangle the ends of this towel only. Towels with fringe ends may be finished by:

1. Brushing with a dry laundry brush.
2. Combing with a steel comb.
3. Beating lightly on the edge of a table. This is the quickest method of finishing.

Roller towel. 3 weft folds only.

Pillow case. 1 warp fold, 2 weft folds.

Sheet. 2 warp folds, 3 weft folds.

Method of mangling. Uncover the mangle. Dust the rollers and the boards. Tighten the tension. Place the fold of the article to the rollers. Pass between the rollers slowly two or three times, so that the moisture is spread evenly, and the material straightened. Open out and air thoroughly. Release mangle tension, and re-cover mangle after use.

Finishing by ironing:

Preparation of clothes. The clothes must be in the correct condition for the fabric; those that are to be finished damp must be evenly damp.

Clothes that have not been starched should be folded and mangled, or folded and rolled down when they are half-dry.

Clothes that have been starched should be dried completely, damped evenly, mangled, and rolled down tightly.

Small embroidered articles, and articles made from a heavy linen, should be damped evenly, and tightly rolled. Mangling these articles gives marks which no amount of heat, moisture, or pressure will remove.

Wrap clothes in a clean cloth and leave $\frac{1}{2}$ hour before ironing. Do not leave damp clothes rolled down overnight as mildew may develop.

Preparation of ironing table. The average heights of ironing surfaces that have been found satisfactory are:

30 inches for a short worker.

32 inches for a worker of medium height.

34 inches or higher for a tall worker.

Ironing surfaces that are too high can be corrected by use of a foot-board.

An ironing board of the correct height fixed in a position where the worker is in good light facilitates household ironing.

The ironing surface should be covered with an uncoloured blanket and a sheet. These should be held firmly in position by tapes, so that the ironing sheet is taut. An ironing board should have a glove-ended cover, which keeps in position.

The following are required:

Iron stand. This may be of asbestos or metal. A stand is unnecessary with electric irons, as these have a heel adapted for an ironing stand.

Iron holder if flat irons are used.

Small bowl on a plate for damping water.

Piece of muslin for damping.

Preparation of iron. (See Chapter VII for types of irons.)

It must be clean and of the correct heat for the fabric being ironed.

Irons with a plated ironing surface can be cleaned by heating and rubbing with beeswax, olive oil, or paraffin. It is inadvisable to use anything abrasive on this kind of surface; if an abrasive powder is necessary it should be sparingly used in conjunction with the wax or oil.

Care and cleaning of flat irons. New irons should be heated and rubbed with a mixture of equal quantities paraffin oil and olive oil. Leave to cool, and repeat this several times. Wash off with hot soda water, and clean the face of the iron with bathbrick.

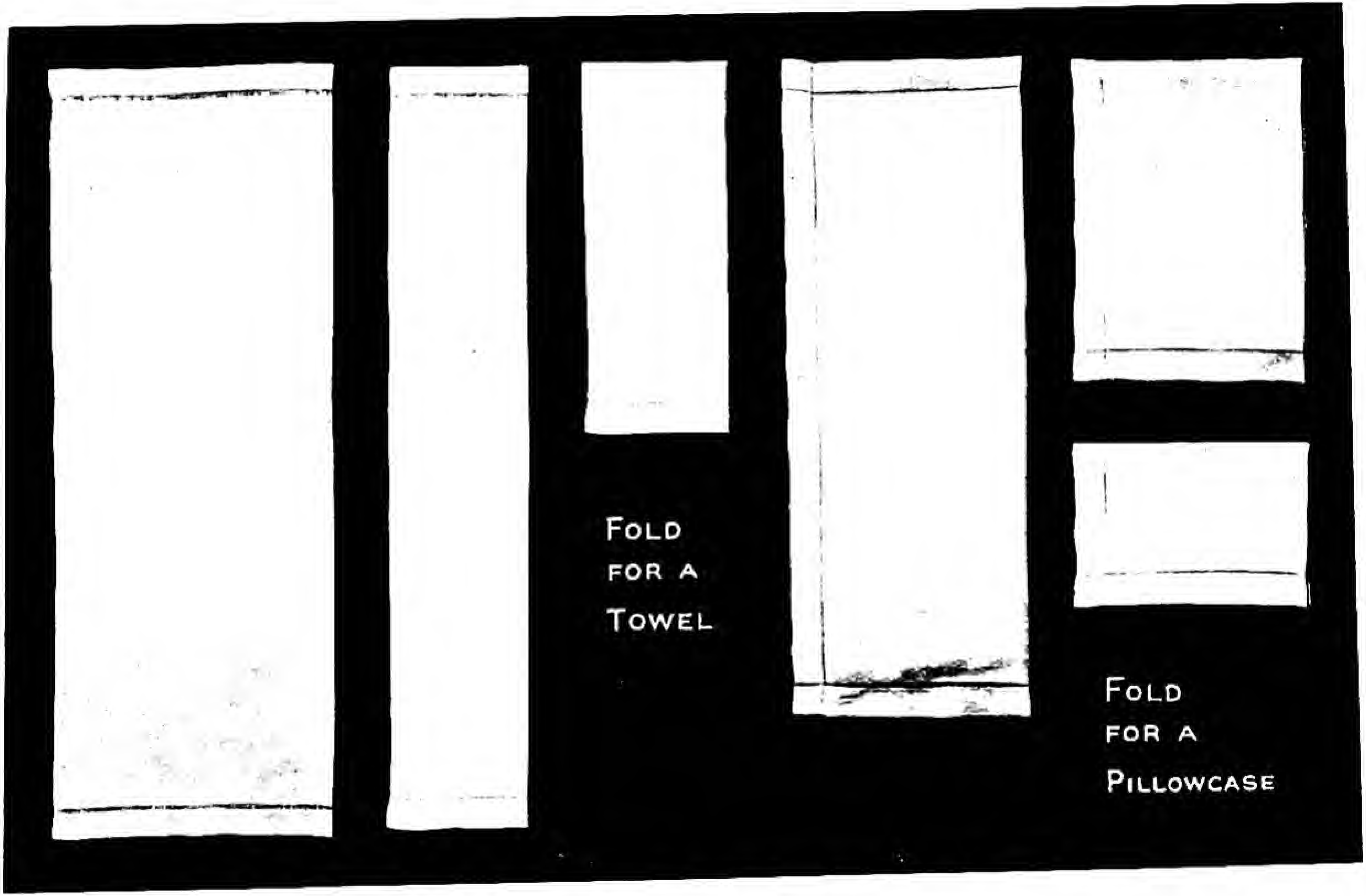
Keep irons in good condition for use by cleaning on a board with a coating of powdered bathbrick, rubbing when necessary with beeswax tied in a piece of cotton cloth, and dusting well.

Irons should be cleaned before being stored, and rubbed with any household fat free from salt, or with olive oil. They need to be heated before use; have as much grease as possible rubbed off with newspaper, then be washed with hot soda water, and dried.

To heat flat irons. The use of a heating stove of some type is necessary for large numbers of irons. These may be heated by:

1. Coke. 2. Gas. 3. Electricity.

Irons that have to be heated in direct contact with the source of


FOLD FOR A TOWEL
FOLD FOR A PILLOWCASE

heat are very difficult to keep in perfect condition. A sheet of metal between the source of heat and the face of the iron is to be recommended. Irons that are heated directly over gas must have the moisture rubbed off the face during the first few minutes of heating. Coal gas contains carbon and hydrogen, which on burning join with the oxygen of the air to form carbon dioxide and water-vapour. This water-vapour condenses on the cold surface of the iron, and continues to form moisture until the iron becomes hot. This moisture acts on the metal to form rust, and thus will cause pitting of the surface if not removed.

To test the heat of an iron:

1. Hold the iron over the back of the hand, and train the hand to realize differences in heat.

2. Dip a finger into a bowl of water, and allow a drop of water to fall on the face of the iron.

A cold iron:	The water makes no sound and does not dry.
A hot iron:	The water makes a sharp sound, and dries quickly.
A very hot iron:	This can usually be recognized by the heat which radiates from the iron, and makes it too hot to handle with comfort. A drop of water makes a sharp hiss, forms a ball, and bounces off the iron.

General rules for ironing. A clean iron is necessary.

The heat of the iron is regulated by the material, and the amount of moisture present in it.

The side on which material is ironed depends upon the finished surface that is required. The art of ironing is to return material to its original surface-finish without the means of attaining this being apparent.

Iron all double and thick parts first on the opposite side of the material to that on which the main ironing is to be done.

Iron seams on the wrong side.

Iron small parts and trimmings.

Place work carefully before starting to iron, then iron without any replacing as far as possible. Use the left hand ahead of the ironing to smooth the work, and to hold where necessary, but *never* to stretch the material as this results in loss of shape.

Iron with the warp threads when possible, working from right to

left. Small embroidered articles should have the centre threads blocked out straight, warp and weft, then ironing continued outwards, keeping the threads of the material straight.

Iron heavily over stitchings, keeping the iron in position a sufficient time to dry the stitching, and the thickness of the material; this prevents rough dryness after airing.

Embroidery and lace should be ironed on the wrong side over a flannel pad.

Iron single material where possible and practicable.

Turn garments and articles during ironing as little as possible.

It is important to give good pressure throughout ironing, and to iron material to dryness.

Methods of ironing table linen:

Table napkin:

1. Stretch the table napkin after damping, and fold into a 3-screen fold with the hems in each hand.

2. Mangle in this fold and roll down for ½ hour.

3. Place folded on table with the right side on top, and so that when this fold is opened back the other two-thirds of the right side will be in position for ironing. Iron one-third, open out, iron across two-thirds, refold and iron the first one-third again. Press heavily over the hems.

4. Fold in a 3-screen fold across, and press in the folds.

5. Air.

Plain tablecloth:

1. Stretch the cloth into shape after damping, and fold evenly in a 4-screen fold; two workers must do this for a large cloth.

2. Mangle in this fold, and roll down for ½ hour.

3. Press in the centre fold on the wrong side; this is a useful guide for final folding.

4. Open out half the cloth to centre crease, and place straight on table right side uppermost with selvedge straight by the table edge. Roll up the other half of the cloth to the centre crease.

5. Iron the half of the cloth spread on the table, working with the warp threads.

6. Place ironed part over edge of table; spread out the second half and iron in the same way.

7. Refold in the 4-screen fold by folding back each half to centre crease. Press in the folds.

8. Fold into 4-screen fold across. Press in the folds.
9. Air.

Fancy table linen:

1. Roll down for ½ hour after damping. Do not mangle.
2. Stretch into shape before touching with the iron.
3. Iron from the centre, keeping straight with the warp and weft threads, and gradually working out to the edge, keeping warp and weft threads at right angles to each other over the whole surface.
4. Iron heavily embroidered table linen on the wrong side entirely.
5. Press lace over a flannel pad.
6. Air.
7. Roll or fold lightly.

Round mats:

1. Place straight on the table.
2. Iron the centre with the warp, then the weft threads.
3. Work out to the edge, keeping the threads of the material straight.

Methods of ironing typical garments:

Maid's morning apron:

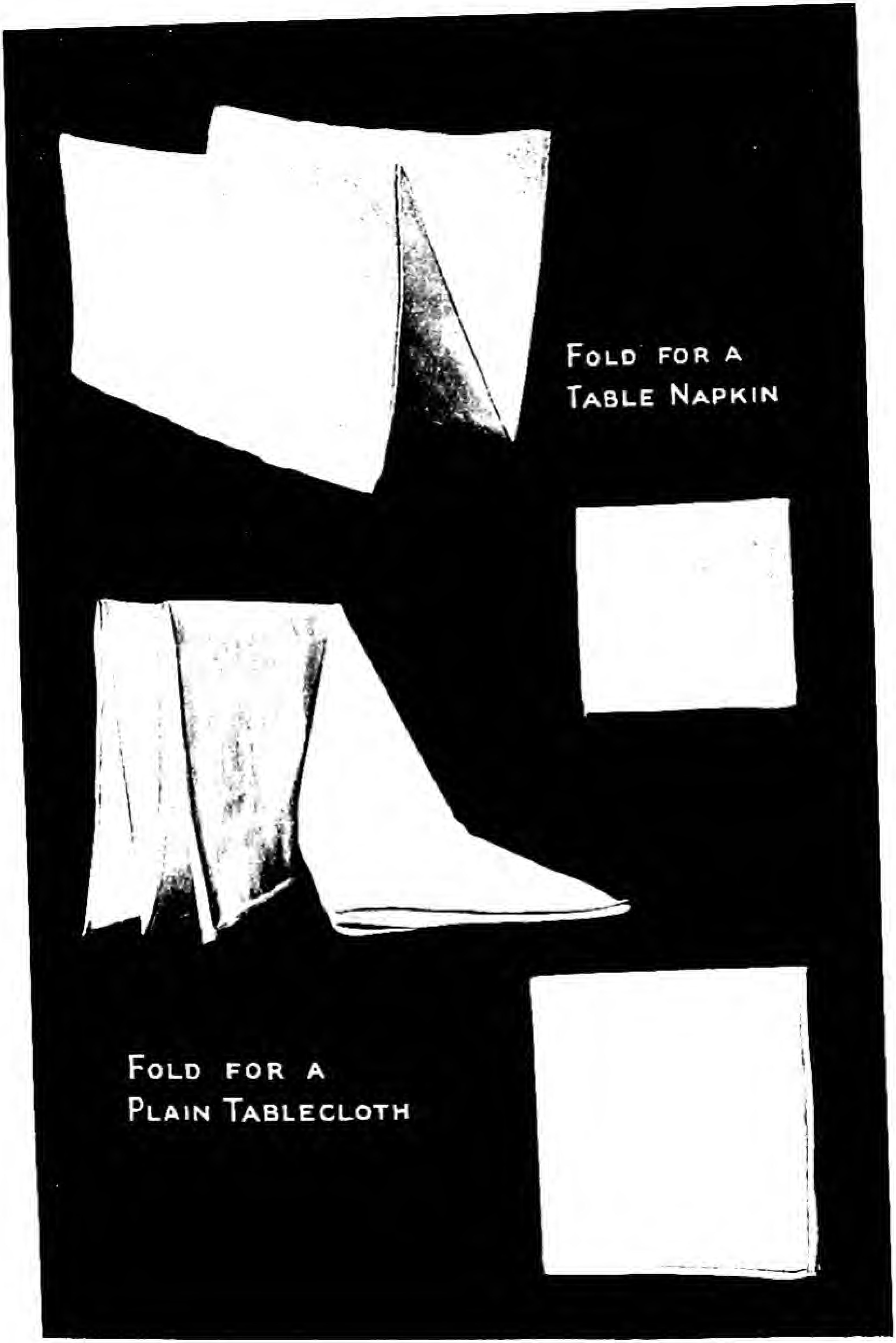
1. Iron double parts on wrong side, i.e. straps, band, back of pockets, hem.
2. Turn, place bib straight, roll skirt up to waistband.
3. Iron straps and bib.
4. Iron band.
5. Open out skirt, place with band to the left hand, and iron from hem up to band, beginning at right or left side according to table space and skill of worker in keeping the ironed part uncrushed. The less skilled worker would be advised to begin at the left side and put ironed part across table as it is finished.
6. Air.

To fold:

1. Place front of apron on table wrong side uppermost.
2. Fold sides of skirt over centre front.
3. Fold skirt in half to waist.
4. Fold bib over skirt.
5. Fold straps to the back.

Knickers:

1. Iron double parts and seams on wrong side.



FOLD FOR A TABLE NAPKIN

FOLD FOR A PLAIN TABLECLOTH

2. Turn and iron double parts on right side; when ironing elastic and hem at knee and waist iron 3 inches to 4 inches of the plain material beyond.

3. Place extra back fullness flat and double by back seam, and iron to dryness on both sides.

4. Place left leg flat on table, front uppermost, folded straight by leg seam; iron the seam; iron across to fold at side, ironing in the fold; iron to knee and to waist.

5. Turn iron back of left leg on the front that is already ironed.

6. Place right leg on table, folded straight by leg seam, and iron in the same way as left leg.

7. Air.

To fold:

1. Fold legs together, fronts inside.

2. Fold back fullness over legs, so that they form a strip.

3. Fold into three, and fold back one leg.

Petticoat:

1. Iron double parts and seams on wrong side.

2. Turn, iron double parts and any trimmings as necessary.

3. Place petticoat flat on table by right-side seam, front uppermost, and neck to the left hand, iron from hem to neck across the whole front.

4. Turn, and iron back on front.

5. Petticoats with fullness at the sides can be ironed flat on the table by ironing the top part first in the method described in (3), finishing it on both sides; then ironing as much of centre front of skirt as possible on centre back; reversing and ironing back on front; refolding so that side fullness comes over centre back and ironing both sides this way, then touching up the centre back as necessary.

Alternative method is to iron on a skirt board:

1. Iron double parts and seams on wrong side.

2. Turn and place over a skirt board, roll skirt over towards waist, spread out top of petticoat and iron.

3. Slip the top part off the board, spread out skirt and iron.

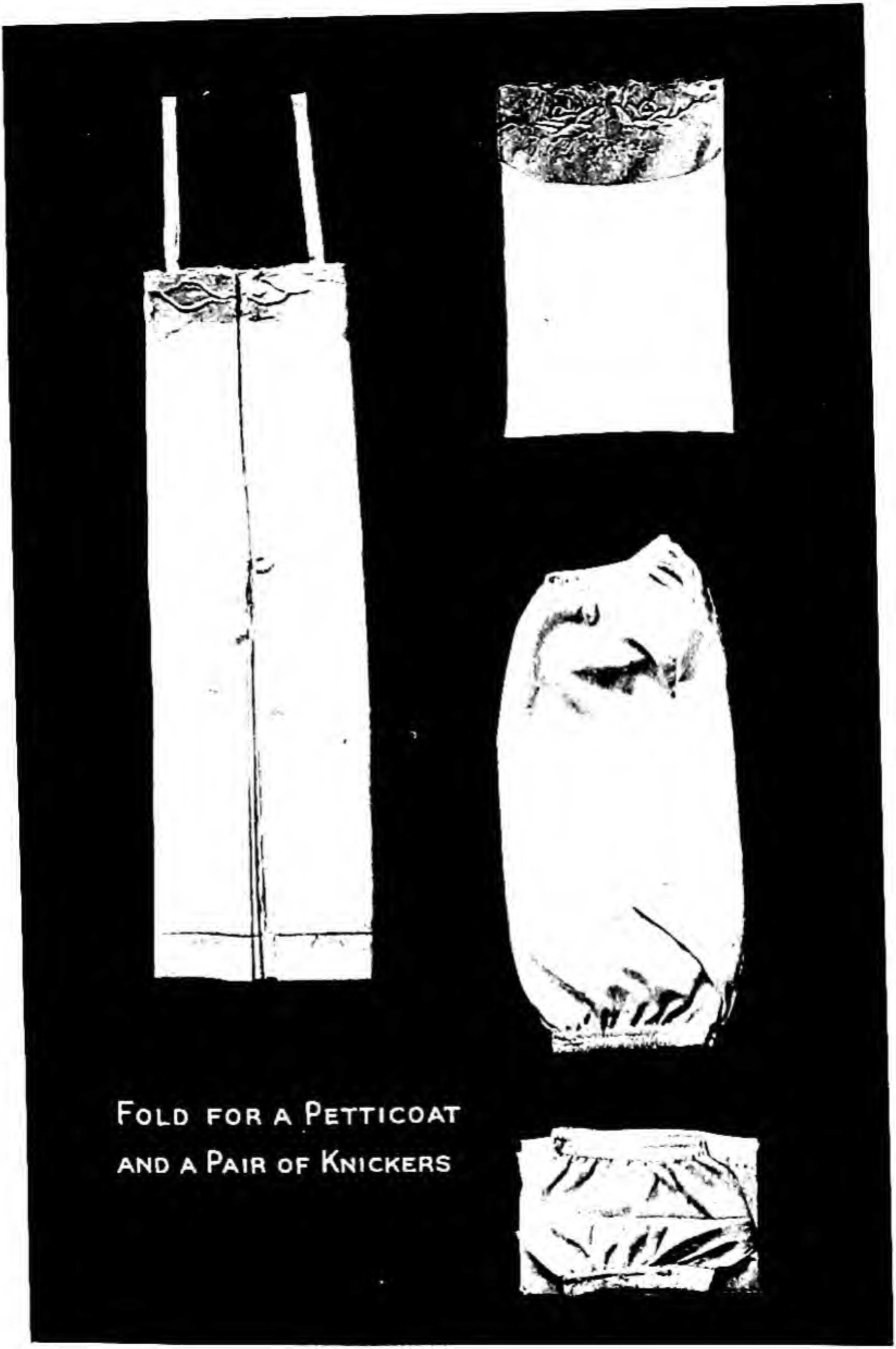
4. Air.

To fold :

1. Place flat on table, back of petticoat uppermost.

2. Fold sides towards centre back, so that petticoat forms a strip.

3. Fold in two or three according to length.



Fold for a Petticoat and a Pair of Knickers

Magyar nightdress:

1. Iron double parts and seams on wrong side.
2. Turn, iron double parts and seams on right side.
3. Place top of nightdress flat on table front side uppermost, roll skirt up to edge of table.
4. Iron all the top from left sleeve across to centre front, and from right sleeve across to centre front.
5. Turn, and iron back on front.
6. Open nightdress and refold by side seams, with fold down centre back.
7. Iron half back, turn, iron second half of back on that already ironed.
8. Open front over back, and iron from hem up to the top part that was ironed first, working across the whole front.
9. Air.

To fold:

1. Place flat on table, back uppermost.
2. Arrange finished width at shoulder, and fold sides over centre back, tapering towards the hem.
3. Fold in three.

Blouse:

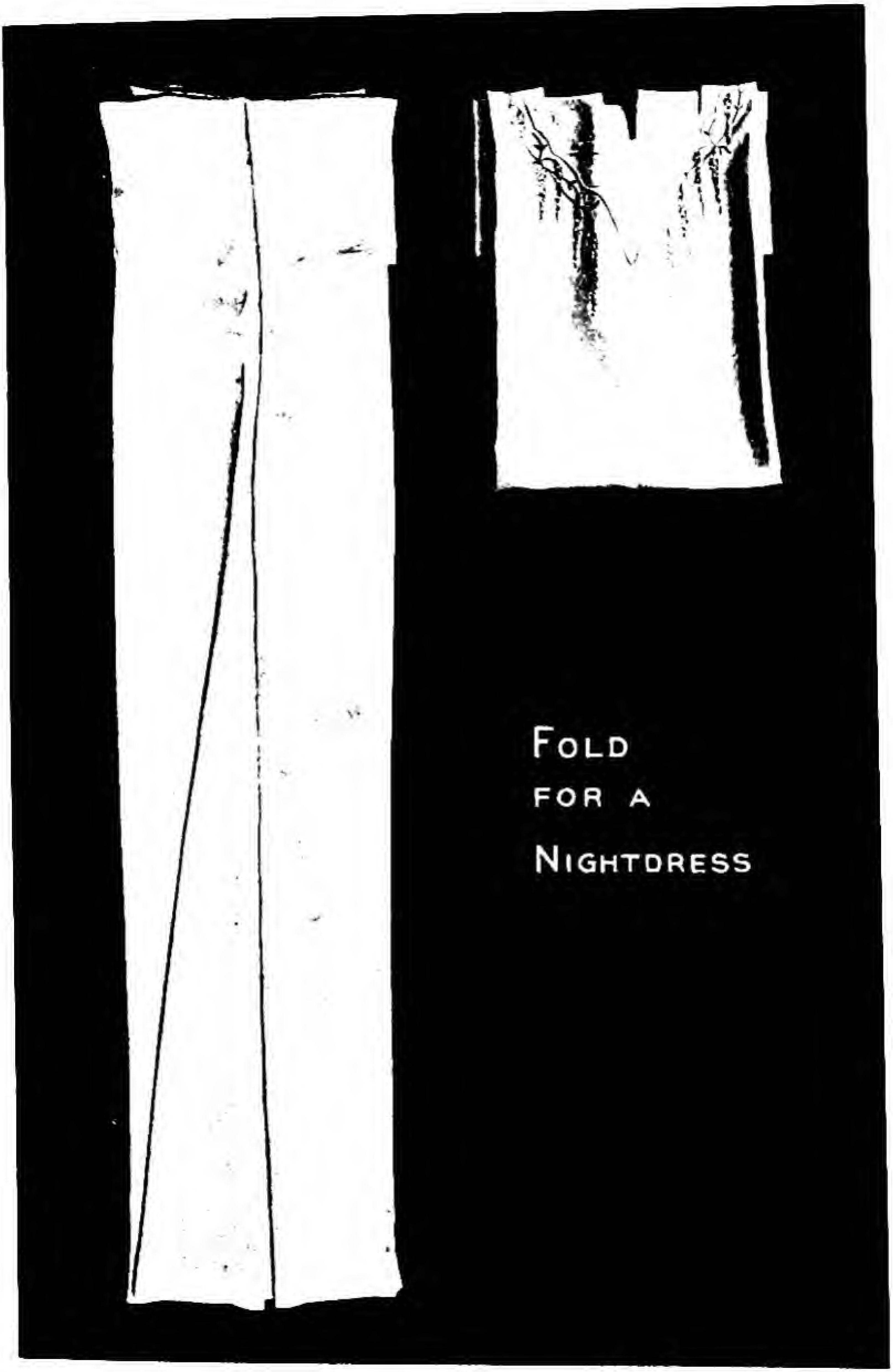
1. Iron double parts and seams on wrong side.
2. Turn out sleeves, and iron either flat on table or on a sleeve board; the former is the quicker method, and suitable for all cotton fabrics. It is not so suitable for silk or thin fabrics where ironing double material leaves the underside with a poor finish.

To iron on table: Place sleeve straight by under-arm seam with front uppermost. Iron seam. Iron across to within ½ inch of fold. Iron up to shoulder and down to wrist. Turn, iron back of sleeve in the same way. Open unironed ½ inch over the ironed back of the sleeve, and iron this unironed part without putting any creases in the material underneath.

To iron on sleeve board:

Iron cuff and lower half of sleeve. Slip this over the end of the sleeve board. Iron top of sleeve.

3. Iron shoulder straps over corner of table.
4. Place the ironed sleeve to the left hand.



Fold for a Nightdress

5. Iron right front, and place across table.
6. Iron back, place across table.
7. Iron left front.
8. Iron collar, working from points towards centre back.
9. Air.

Overblouses can be ironed most easily on a skirt board. They can be ironed flat on the table by the method described for a Magyar nightdress, but without making a crease down the centre back.

To fold:

1. Fasten blouse.
2. Place flat on table, back uppermost.
3. Fold sides towards centre back from the point of the shoulder.
4. Fold sleeves down straight, so that the blouse forms a strip.
5. If the blouse has to be kept in small space put a strip of paper down the back of the blouse before folding, and fold in three, bringing the collar on top and arranging it last.

Dress. A skirt board and sleeve board facilitate the ironing of a dress, and give the quickest method for finishing most modern fabrics.

1. Iron the sleeves.
2. Iron the top, keeping skirt rolled over to waist.
3. Slip top over end of board, spread out skirt, and iron.

A dress can be ironed on the table by the method described for a petticoat, or for a Magyar nightdress, according to its style.

The folding of a dress is similar to that of a blouse. The skirt should be folded as flat as possible, fullness being arranged as best suits the shape. Fold in two or three according to length.

Shirt:

1. Iron seams and double parts on wrong side, placing the yoke flat on the table for ironing.
2. Turn to right side, iron yoke to dryness.
3. Iron collar.
4. Iron cuffs and sleeves.
5. Fold back in half, side seams together, and iron back with fold down centre, ironing half back, turning and ironing the other half on the ironed part.
6. Place with front uppermost, fold and press in the back pleat, working from the inside.

Lace. The lace should be dry or almost dry according to type. Place wrong side uppermost over a pad of flannel. Press with a cool iron; the heat of the iron must be very carefully controlled.

Embroidery. Embroidery on garments should be pressed like lace. Any article with thick embroidery can be pressed in the following way:

Spread an ironing felt on the table, and immediately on top of it a very wet cloth. Place the embroidered article right side down on the wet cloth. Cover with a second very wet cloth. Press on top of this with a hot iron until the top cloth is dry. Remove both cloths. Place the embroidery wrong side down over a dry ironing felt and sheet, and press. This presses the embroidery and the background without the appearance of any unsightly glaze.

Woollens:

1. Undergarments are pressed like knitted fabrics.

2. Light-weight fabrics. The fabric should be dry. Place wrong side uppermost over an ironing felt and sheet. Place a piece of damp muslin over the fabric. Press with a moderately hot iron till the muslin is dry.

3. Heavy-weight fabrics. Place the dry fabric over a very thick ironing felt or a pad of flannel in addition to the usual ironing felt. Place a piece of flannel over the fabric, and on top of this a wet cloth. Press with a hot iron. This method of having felt each side of the fabric being pressed gives very satisfactory results for pressing all thick materials, and is a useful method for shrinking woollen fabrics before being made into garments.

Crêpe and pile fabrics. These should be steam pressed from the back of the fabric. The steam can be supplied by wet muslin. This can be placed over the wrong side of fabric, and the iron passed over lightly so that the material is straightened, but the weight of the iron must not rest on the fabric so that crêpe or pile is flattened. An alternative method for these fabrics is that described for velvet steaming on p. 111.

Pleats. Pleats in all materials, whether for ironing or pressing, should be prepared in the following way:

Iron or press all the garment flat, working as far into the pleats as possible.

Place the garment over a skirt board. Pin the heading of the pleats firmly into the board cover. Arrange the pleats in their correct position. Pin into the board cover at the bottom of each pleat, with

the pin slanting in such a way that the pleat can be ironed or pressed to the very end without the pin making a mark in the material. The pleats should be stretched taut, so that there is no need for tacking or pinning throughout their length; any such tacking or pinning would leave marks after ironing or pressing. Iron or press very well. Unpin from the board, and pin the bottom of the pleat in position. Leave pleats pinned during airing. Dry cleaning, which does not remove pleats, is the best method of cleaning finely pleated garments; when these garments must be washed and cannot be repleated at home, they can be repleated by commercial firms for a small charge. Electric irons, with a specially adapted base, are available for repleating.

Use of a calender. These can be attachments to fix in place of the wringer on an electric washing machine, or they may be separate units of a small size to use on a table, or of a larger size which has its own stand.

The roller must be thickly and evenly padded, then covered with a well-fitting washable cloth. This roller is mechanically driven, and uses little current.

The metal shield has the heating element embedded in it. It has a separate control switch from the roller, and uses a varying amount of current according to its size. Prepare all the clothes to be finished; they should be slightly drier than for ironing.

Switch on the current to heat the shield.

Dry hems with the roller stationary.

Place articles very straight on the roller, press down the lever to bring the shield into position, and start the roller revolving.

Use both hands to straighten the article as the roller revolves. It is most important to place material straight before it passes under the shield, or creasing may result.

Pass through two or three times till the article is dry.

See Chapter VIII for further description of a calender.

The finishing of frills. This is not very important at the present time, as no housewife will buy articles which involve the finishing caused by frills. Crimping and goffering are methods of finishing that can be used.

Crimping. This is suitable for frills that are not very full. Iron the edge of the frill; it is not necessary to iron into the gathers. Place the frill in front of the worker parallel to the table edge. Use a cool, light-weight iron with a straight heel. Place the iron on top of the frill, and the fingers of the left hand under the frill. Make a sharp, definite

movement to the right, pushing the material with the fingers, and ruckling it evenly under the edge of the heel of the iron. This should produce a series of tight even creases. Move the iron and fingers 1 inch to the left. Make the same sharp movement to the right, joining up with the beginning of the first crimping done. Continue along the whole frill in this way.

Goffering. This can be done by use of goffering irons, or by a goffering machine. The housewife will use goffering irons, but a machine is used in institutions and power laundries. The frill must be stiffly starched and ironed almost dry. Heat the goffering irons, clean on a duster, and test on kitchen paper. Any mark left on the paper shows that the irons are too hot to use. Place the frill parallel to the table edge. Grip the frill with the irons, having the thumb underneath, turn till the thumb comes up to the top, at the same time holding down the goffer with the fingers of the left hand. Draw the goffering irons out straight. Continue working in this way from left to right, moving a sufficient distance each time to allow the previous goffer to stay upright. Air thoroughly as soon as the goffering is finished, or any moisture left in the material will spread and cause the goffers to lose their shape.

CHAPTER XI

TREATMENT OF WOOL

THE tendency of all woollen fabrics to felting and shrinkage, owing to the nature of the fibre, is the important factor to remember throughout all laundering processes.

Preparation. Woollen materials are of a loose structure that holds dust; this should be removed by shaking before washing. Wool holds much moisture, and is very heavy when wet; holes and thin places in heavy woollens are liable to enlarge during washing, they should be repaired before articles are wetted.

New woollens should be steeped in a warm water made slightly alkaline with borax for a short time before their first wash, because of the possibility of sulphurous acid left in the wool from sulphur bleaching. Woollens are not steeped otherwise, because dirt leaves the fabric easily, and long immersion in water is harmful to the fibre.

Stain removal. Fresh stains on woollens should be treated at once with cold or warm water according to the type of stain. Wool does not absorb colouring matter rapidly, so that stains treated when fresh are easily removed.

Stain removal agents should be used in solution. Weak acids have less harmful effect on the fibre than weak alkalis. Bleaching should be done carefully; it must be remembered that Javelle water must never be used on wool. The bleaches that may be used are hydrogen peroxide, sodium perborate at a moderate temperature, or sodium hydrosulphite. All bleaches must be carefully controlled as regards strength, temperature, and length of contact.

Cleansing. Washing must be done quickly, so all waters must be prepared before any garments are wetted.

Wash several woollens at one time, or a selection of articles that require the same type of washing, so that the maximum use is made of the washing waters.

Wash woollens on a day when they can be dried immediately. Washing waters should never be hotter than 100°–110° F. Plan the wash, and prepare as many waters as needed for cleansing.

Wool is affected by alkalis, so avoid the use of any with a strong action, e.g. soda, for water softening. There are two alternatives where the water is very hard. The cheapest method is to store rain water and use it when it is practicable for all woollen washing; the other method is to install a household water-softening plant. The use of ammonia in the water for white woollens, and borax for white and coloured woollens, helps to prevent wastage of soap by counteracting the slight acidity of the wool.

The washing waters must have a permanent lather made from a pure soap, or pure soap flakes. The use of a soap solution made from a soap containing a grease solvent is successful for very soiled woollens.

The cleansing methods used for woollens are kneading and squeezing, or suction washing. Squeeze out between washing waters, or machine wring, never wring by hand. Extra soap solution can be squeezed through very soiled parts. It is most important that no friction should be used in washing woollens.

Rinse in several waters of the same temperature as the washing waters to effect the thorough removal of soap. Warm rain water is very effective for rinsing, even if it is not possible to use for the whole of the cleansing process.

Fold evenly and pass two or three times through a mangle, or wringer.

An alternative method for very fine woollens is to wrap them in a dry cloth or towel and press, or to fold in a dry cloth, and pass through the wringer, or mangle, with a loose tension. The cloth protects the fine wool from being cut by the pressure of the rollers. Wool holds moisture, it will dry slowly, and the weight of the moisture may cause stretching if it is not removed thoroughly before drying.

Drying. Shake, stretch into shape, and hang up to dry by the thickest parts in a warm, dry, moving air, where moisture will evaporate quickly. Wool must never dry in strong sunlight or near intense heat.

Fine woollen garments and articles that are liable to stretch out of shape can be dried flat on a rack, or a plain wooden chair used as an improvised rack, or on a table that stands in a suitable drying position; in this way their shape will be retained. Lift, shake, and turn occasionally during drying.

Jumpers and cardigans should be dried on a long pole or brush handle. Place this through the sleeves, shape, and clip together at the bottom with clothes pegs if necessary. The pole can be supported

across a clothes horse or tied on to a clothes cord; in this way the wool is surrounded by a current of air and dries quickly. Shake and turn during drying. Attention to shaking and shaping during drying will give a satisfactory result and minimize finishing.

Finishing. Woollens that are shaken during drying and dried into shape require little finishing. The elasticity of the wool may be spoiled by excessive finishing. Woven woollen fabrics, e.g. flannel, delaine, require to be taken down from drying whilst slightly and evenly damp, and ironed at once. If these materials become quite dry they can have surface moisture applied by rubbing over evenly with a pad of damp muslin and rolling down ½ hour before ironing.

Knitted woollens should be dried completely and pressed on the right or wrong side according to the colour, surface finish, and type of garment. The wool holds sufficient moisture to give the requisite finish to these garments without any additional dampness.

Knitted woollens that require a very smooth finish, particularly outer garments, are steam-pressed when dry on the right or wrong side according to the colour and the surface finish required.

All dark-coloured woollens are finished on the wrong side to avoid glaze.

Woollens that have been teased to a fluffy finish can be brushed with a dry stiff brush, or a teazle brush.

Crêpe woollen materials that are washed should be pressed on the wrong side when almost dry, or steam-pressed on the wrong side when dry. The additional shrinkage of these materials due to weave must be calculated, and where this cannot be allowed materials should be dry cleaned. Garments should be measured before washing, stretched during drying, and steam-pressed to correct shape and size in finishing.

Treatment of heavy woollens. The information already given about woollens applies to the treatment of large and heavy woollens, but these should only be washed where there is suitable apparatus, such as a tub and long-handled suction washer, or a washing machine with a suitable cleansing action.

Heavy woollens must not be subjected to cleansing for too long a period, or shrinkage will be caused in proportion to the length of the cleansing period. They should be washed on a day when they can be dried outside. A continual supply of warm softened water is needed, and must be planned before the woollens are wetted, so that they will not be left wet for any length of time. The water should not be of a higher temperature than 100° F., and there should be a good permanent

lather on it throughout the whole of the cleansing. The woollens should be surrounded by plenty of water, though a sufficient number of articles should be washed at one time to ensure economical use of water, and energy expenditure. The working of the suction washer on the woollens, or of the woollens in the machine, must be at a slow rate, and should not be carried out for longer than 2 minutes. Rinsings must be thorough, as thick woollens retain soap, and they must all be of very short duration. Thorough removal of soap is essential, and where hard water must be used for washing, heated rain water is recommended for final rinsings. Wringing by mangle or wringer between waters must be done, and after final rinsing the woollens should be folded and wrung several times. Shake carefully before hanging up to dry, as wet wool is soft and can be damaged by careless shaking. Two people are needed to do this properly.

To hang rugs and blankets fold in half, and peg the two edges about 4 inches over a taut clothes line to ensure drying in shape. Shake and turn during drying, then no finishing will be necessary. Hang dressing-gowns from the shoulders, and peg securely to the line. These may need finishing by pressing, or steam-pressing, according to the type of material. Drying should be done in the shade out of doors, never in strong sunlight; or in warm moving air if drying must be done indoors.

Coloured woollens. All the rules given for woollen washing apply to the treatment of coloured woollens. Temperature of water, and water softening, are the most important factors, because of the effect of heat and alkalis on colour. Washing should be done very quickly, and the temperature of water should be lowered if colour is found to leave the fabric. All the rinsing waters must be the same temperature, and the final rinse can be made slightly acid with acetic acid or vinegar if colours need to be revived. Removal of moisture must be thorough to prevent colour spreading along the fibres. It must be done carefully; if necessary a piece of old cotton cloth can be put between folds of material before garments are wrung. Drying must be carried out as speedily as is consistent with this fibre. Finishing will depend on the surface finish of the material. Avoid glaze by finishing on the wrong side.

Felting and shrinkage of wool. The factors that will help to prevent the felting and shrinkage which renders woollens unusable are:

Even temperature of all washing waters between 100° and 110° F.

Use of rain water in place of hard water.

Use of borax or ammonia when alkalis are necessary.

Use of a pure soap, or pure soap flakes.

Quick and careful cleansing, so that the serrated fibres of the wool are not entangled.

Thorough removal of moisture before drying.

Drying in a warm moving air, so that long retention of moisture is avoided.

Avoidance of excessive heat and moisture in any finishing process.

CHAPTER XII

TREATMENT OF SILK

SILK requires careful treatment in laundering because the fibre is generally made into fabrics of fine texture. The natural sheen of the silk fibre and the fine weave of fabrics may be spoiled by heat and friction.

Preparation. Repair ladders in knitted silks.

Very soiled white silks, and pale shades that tend to become discoloured through wear, can be steeped in warm water with a small proportion of borax for a short time immediately before washing. Otherwise silks are not steeped because the fibre cleanses easily.

Stain removal. Stains should be treated when fresh if it is possible, cold or warm water being used according to the type of the stain. Stains that have dried into silk are difficult to remove, particularly so on coloured silks where a bleach cannot be used owing to the possibility of injury to colour. Acid stain-removal agents are less harmful than alkalis. Weak solutions of oxidizing bleaches may be used, e.g. hydrogen peroxide, diluted 1 : 6 with cold water, and made slightly alkaline with a few drops of ammonia for white silks, or a small amount of borax or sodium perborate solution for coloured silks. Javelle water must never be used on silk, as it rots the fabric completely. Reducing bleaches, e.g. a warm solution of sodium hydrosulphite, can be used with safety. Bleaching must be carefully controlled as regards strength, temperature, and length of contact with the fabric. Grease spots are sometimes difficult to wash out of silk because of the low temperature of the washing waters. These spots should be treated with a grease solvent or a grease absorbent previous to washing.

Cleansing. Silk materials being of a fine texture require careful cleansing.

The important factors are:

The temperature of waters should be 100°–110° F.

Soft water should be used where possible.

Pure soap in solution, or pure soap flakes, should be used to make a permanent lather on washing waters. Soap containing a grease-solvent is successful for very soiled silks.

The cleansing action should be kneading and squeezing or suction washing. Soiled parts can have extra soap solution squeezed through them; no friction may be used. Sufficient soapy water must be used to cleanse the silk. Rinse in warm water to effect thorough removal of soap, then in cold water to clear the colour and stiffen the fibre. A small proportion of acetic acid can be added to the final cold rinse for silks to improve the sheen. Thin silks can be stiffened by the addition of gum water to the final cold rinse.

Removal of moisture and drying. Thin silks should be squeezed out tightly by hand, rolled down in a dry cloth for ½ hour before ironing. Strong silks can be wrapped in a dry cloth, and passed through a rubber wringer with a loose tension if necessary, or spread on a dry cloth or towel, rolled in this, and the moisture pressed out.

Thick silks should be dried partly, but at the same time evenly. Silk will not damp by sprinkling like cotton, as there are no hairs on the fibre to assist the even absorption of water.

Wild silks are dried completely. These have the natural gum left in the fibre; this causes them to straighten under the heat and pressure of the iron. These silks become unnaturally stiff if ironed damp.

Strong sunlight, has a tendering action on all silk, and will cause white silks to become yellow. Silk dried out of doors should be placed in the shade.;

Finishing. Wild silks are ironed when dry on the right or wrong side according to colour and surface finish.

Cultivated silks are ironed when evenly damp, but not wet, on the right or wrong side according to colour and type of fabric. It is only even dampness that will give a uniform result. Dark colours should be ironed on the wrong side when possible, parts that must be ironed on the right side can be protected with dry muslin to prevent glaze.

Silk scorches easily, so requires to be ironed with a moderately hot iron. The iron can be tested on kitchen paper till the correct heat of iron is known; no mark should be left on the kitchen paper when the iron is placed on it. An iron that is too cool will drag and crease the surface of the silk instead of giving a smooth finish.

Iron silk to dryness, using even pressure to obtain a uniform result.

Coloured silks. Any silks of doubtful colour or pattern should be tested for colour bleeding on an unimportant part. (See Coloured

Cottons, p. 81.) If colour is found to be unstable, garments should be dry cleaned. Printed silk scarves, padded ties and dresses should be carefully examined and tested when thought necessary. Coloured silk that is washed should be treated quickly, the wash waters being kept at 100° F. or lower. Several rinses should be given, as these clear the background if any colour should have moved. The final rinse should be cold, and can be made slightly acid with acetic acid or vinegar to help to revive colour. Squeeze out tightly, and place in a white cotton cloth, with another cotton cloth between any folds of the silk, and press out moisture. This prevents colour spreading on to other parts of the same article. Dry and finish at once.

Padded ties should have the padding tacked in place before washing; the tacking should be removed before ironing, which should be done over a thick flannel pad.

Scarves made from cross-cut material should be ironed with the warp threads of the material; in this way the scarf retains its shape.

Velvet. This is a silk pile fabric. Dry cleaning has been the only possible treatment for velvet, because the soft pile would not recover from washing in the same way as the stiffer pile of velveteen. The latest development of velvet manufacturers is a washable velvet, woven with a crinkly surface, that can be cleansed by suction washing, hung up to dry, and requires no pressing. Velvet should be examined carefully before any treatment or stain removal is attempted, because its surface can be spoiled very easily. Dry cleaning solvents and absorbent powders can be used with safety. A steam iron or press, a steam-heated puff, or a velvet pressing-board are useful apparatus for working on velvet. The housewife who does not possess such apparatus can effect much by steaming for the removal of creases and water spots. Methods of steaming are to hang or hold the velvet so that a continual flow of steam will strike the crease, or to place a damp cotton cloth over the sole-plate of a moderately hot iron standing on its heel and draw the velvet across with the wrong side to the damp cloth. Hang velvet up to dry, as it will crease again if left damp from steaming.

Knitted silks. These are treated by the usual washing method, care being taken not to stretch or pull whilst wet. Remove moisture by squeezing and wrapping in a dry cloth and pressing. Dry flat to prevent stretching. Place, and press preferably on the wrong side. Do not iron, as this will cause stretching out of shape.

Georgette and crêpe fabrics. The colour and the type of fabric must decide the treatment to be given. All these fabrics will dry clean

successfully. Materials with a very slight crêpe finish, e.g. crêpe de chine, will wash successfully; materials with a deep crêpe finish are liable to shrink. Any garment that will not allow for probable shrinkage should be dry cleaned. Finishing should be done on the wrong side when the material is almost, but not quite dry; the best way to obtain this condition is to half dry according to the thickness of the material, then roll down in a dry cloth, with another dry cloth between the folds, for ½ hour before ironing.

Weighted silks. These silks are not satisfactory in wear, and should be avoided when possible. The best way for the housewife to test for weighting is by burning a piece of the silk. Weighted silk blackens and retains its shape, whereas pure silk always forms a brittle black ball. These silks are readily destroyed by perspiration; the stained part tends to fall to pieces more readily in washing than in dry cleaning. Dry cleaning is preferable to washing for all weighted silks. The pressure in finishing should be light, or the fabric, if it should be excessively weighted, is liable to split at the folds under pressure.

CHAPTER XIII

TREATMENT OF RAYON

THE name rayon is becoming universal for synthetic textiles prepared from cellulose. The names 'artificial silk' and 'lustra cellulose' have been used for these textiles, but the more expressive name 'rayon' has rapidly become recognized since its first introduction in 1924 in the United States of America. The composition of these textile fibres has to be remembered throughout all laundering processes. All rayon is weaker when wet; the degree of weakening varies according to the composition of the fibre. Hence all rayon needs careful laundering.

Preparation. Ladders in knitted fabrics should be mended. No steeping is necessary, as the fabric cleans easily. It has little affinity for stains, because of the smooth surface of the fibre.

Stain removal. Stain-removal agents can be used in solution as for coloured cottons. Strong alkalis spoil the lustre of the fibre.

Bleaching can be tried with weak solutions of oxidizing bleaches: hydrogen peroxide diluted 1 : 6 with cold water, Javelle water and sodium perborate used weak and in cold solutions. Reducing bleaches can be used on white fabric, e.g. sodium hydrosulphite solution not used too hot.

It should be remembered that cellulose acetate will dissolve in acetone, in glacial acetic acid, and sometimes in chloroform.

Cleansing. Washing must be done quickly, so prepare all waters before wetting the fabric; the temperature of the waters to be 100°–110° F. Use soft or softened water. The washing waters must have a permanent lather made with a pure soap in solution or pure soap flakes.

The cleansing method should be kneading and squeezing, or suction washing. No friction may be used throughout cleansing, very soiled parts should have extra soap solution squeezed through. Care must be taken with knitted fabrics to avoid stretching the fibre to breaking-point through weight of water. Keep the fabric under the water whilst washing. Discoloured fabrics can be washed in waters in which

the permanent lather has been made by any special washing powder that is reliable for use on clothes, preferably one containing sodium perborate. This has a successful action on discoloration caused by wear. An alternative method, if no such soap powder is available, is to use sodium perborate with soap solution in one of the washing waters. Proportion: 1 tablespoonful sodium perborate to a gallon of water. Squeeze rayons by hand when changing waters. Do not wring either by hand or machine, as this causes some materials to split.

Rinse thoroughly, using at least two rinse waters of the same temperature as the washing waters. Rayon squeezes out more easily and dries more quickly from warm water than from cold.

Thin rayons can be stiffened with gum water, the proportion depending on the amount of stiffness required. Average proportion: 1 teaspoonful to ½ pint warm water.

Removal of moisture. Remove moisture by hand squeezing, and wrapping in a dry towel or cloth, and pressing. It is inadvisable to machine-wring rayons, as the grip of the rollers may split the fibres. A wringer with rubber rollers may be used for strong woven rayons. It is important that rayon should be damp and not wet when hung up to dry, as excessive moisture will stretch knitted fabric, and all fabrics will take longer to dry.

Drying. Hang garments by the strongest part so that they will keep their shape. Garments liable to stretch out of shape should be dried flat, in such a way that a current of air can move round them and dry them quickly.

Finishing. The condition for finishing depends upon the type of fabric; the best condition for each individual fabric must be found.

General rules are:

Knitted fabric should be finished when almost dry with a cool iron.

Woven fabrics should be finished when evenly damp with a moderately hot iron.

Dark colours and materials with a dull or crêpe surface should be ironed on the wrong side.

Rayons that are finished damp must be evenly damp, or parts too dry will show as rough dry patches. Attempting to sprinkle too dry rayon leads to uneven surface finish. Uneven dryness can be treated either by redamping or by spreading on a damp cloth or towel and rolling down for ½ hour before ironing. All rayon glazes easily, so care must be taken during ironing to avoid this.

The heat of the iron must be carefully watched during the ironing of rayon, as irreparable damage can be done to cellulose acetate rayon if the iron is too hot. It is wiser to have the iron cool and the material almost dry if there is any doubt about the type of rayon. An indication that the iron is too hot is that it drags the material and wrinkles it. This means that it is really melting the rayon, and when this condition is produced it cannot be remedied. The iron can be tested by placing on kitchen paper, and then lifting. No mark indicates that the iron is not too hot.

Water-marking of rayon during ironing is one of the difficulties that arise with some modern fabrics. Frequently when the fabric has water-marked once it cannot be corrected. Some fabrics and garments have instructions for laundering attached when bought; these should be followed. Doubtful fabrics should be tested on an unimportant part with the fabric almost dry, and the iron cool. If marking is produced at the edge each time the iron is lifted, the fabric should be ironed dry with a moderately hot or cool iron, whichever gives the best result.

The method of ironing has sometimes to be altered when ironing rayon garments to suit the type of material. Some materials have to be ironed quickly all over the single material to prevent water-marking or rough dryness, then double, and special parts have to be ironed last.

Crêpe fabrics. There are many rayon fabrics with a crêpe surface. They can be divided into two groups for laundry treatment. Those with a slight crêpe surface, e.g. rayon crêpe de chine, will wash very successfully. They should be pressed on the wrong side when almost or quite dry, whichever condition is found most suitable for the fabric. Other fabrics with a deep crêped surface do not respond successfully to washing, owing to the uneven shrinkage caused by wetting. These fabrics should be dry cleaned. Garments of this fabric that must be washed, should be measured before wetting, and stretched into their correct shape during drying. They should be finished when quite dry by light pressing on the wrong side; the pressure of the iron must never be such that it flattens and stretches the crêped surface.

The crêpe effect of these materials is obtained through the use of a tightly twisted thread, generally for the weft thread, with a thread of slight twist for the warp of the fabric. This tightly twisted thread tightens further when wetted, drawing the warp threads closer together, hence the shrinkage of these fabrics when washed.

Delustred fabrics. Some rayons are woven from delustred yarn

which produces a fabric with a dull surface. It is very difficult to retain this dull surface after laundering. These materials have to be ironed when they are slightly, yet evenly, damp with a cool iron, as the production of steam through heat and moisture will relustre the fabric. The best way to obtain the correct condition for finishing is to half dry the garment, then roll down in a dry cloth for ½ hour before ironing. Iron quickly, sliding the iron over the surface of the single material on the wrong side; avoid lifting it as much as possible. Iron double parts last.

Rayon velvet. Many types of rayon velvet are in use. These should be carefully examined before deciding on the treatment to be given. Self-colour and patterned rayon velvet will wash very successfully by the method described for velveteen. (See Chapter IX.) Materials with surface-effect finishes, such as spots and stripes, will be completely spoiled if they are touched with water even for spotting. These materials must be dry cleaned.

Household rayon articles. Rayon is used, either alone or with other fibres, for many materials that are used in the home. These are treated by the usual method for laundering rayon; large articles can be washed in a washing machine with a suitable action. Gum water should be used as the stiffening agent when one is needed. 1 tablespoonful to 1 pint is a useful proportion. Moisture should be removed by a rubber wringer or by rolling in a dry cloth and pressing out moisture. Half dry, and finish at once, ironing on right or wrong side according to colour and surface finish.

CHAPTER XIV

TREATMENT OF LACE

LACE-MAKING has been a skilled handicraft in many countries for centuries. Silk and linen threads were generally used; these threads are still used for most hand-made lace. Modern lace may be made of threads formed from any of the textile fibres, and much of it is machine-made. All lace is of a fine texture; this is the important point to be remembered in all cleansing treatments.

Preparation. All lace should be mended before being wetted.

Stain removal. Stain-removal agents can be used in solution according to the thread of which the lace is made. A weak solution of sodium perborate, used when cool, is very effective on stains caused through wear. The lace must be in contact with the solution for 5–10 minutes only. Discoloration from age in hand-made lace is difficult to treat without damaging the threads; sunlight bleaching can be tried for white linen lace, and hydrogen peroxide bleaching for silk lace.

Cleansing. White lace can be steeped in cold water made slightly alkaline with borax for several hours before being washed.

Soap solution should be made from pure soap or soap flakes.

The cleansing method must be such that warm soapy water passes through the lace and cleanses it without any strain or friction coming on to the fine threads. Machine-made lace can be cleansed by careful kneading and squeezing. The following methods are suggested for cleansing any valuable lace:

1. Half fill a wide-necked bottle with warm soapy water. Shake the lace in this. This method is suitable for small pieces of lace.

2. Wrap a strip of flannel round a bottle, wrap the lace round this, move the bottle up and down in warm soapy water. This is suitable for long strips of lace.

3. Tack the lace on to a piece of shrunk flannel or muslin. Knead and squeeze carefully in warm soapy water. This is suitable for shaped pieces of lace.

Rinse thoroughly in warm water.

Boiling. White cotton and linen lace can be boiled if necessary. It should be tied loosely in muslin as a protection, and boiled apart from other articles.

Rinsing. Lace that has been boiled should be thoroughly rinsed in warm and cold waters.

Blueing, tinting, stiffening. White lace can be blued in a very pale-blue water. All lace should be stiffened, when necessary, by using gum water. It is not advisable to use starch for lace stiffening, because of the possibility of rotting the fine thread. The blueing and stiffening, or the tinting and stiffening, of lace should be done together, the gum water being put into the blue water, or the tinting solution. Average proportion: 1 teaspoonful gum water to ½ pint blueing or tinting solution. Tinting solutions suitable for lace are:

1. An infusion of tea and coffee, allowed to stand, and strained well. This gives a cream tint.

2. A solution of any dye for coloured lace. The solution should be strained, and should be the depth of colour required.

The tinting solution should be squeezed evenly through the lace so that the result is an even colouring. The lace will be much lighter when dry, hence the colour when wet should be twice the depth required when finished.

Removal of moisture. Remove moisture by careful squeezing. Large pieces of lace can be wrapped in a dry cloth and pressed.

Drying. Machine-made lace should dry by hanging straight or lying flat on a cloth.

Hand-made lace should be pinned out to dry with rustless pins.

The right side of the lace should be uppermost, and the whole of the lace shaped so that the threads are straight. This allows the pattern of the lace to be raised through the tension of the surrounding threads. Lace that is well pinned out will require little finishing. A board covered with flannel is useful for pinning out lace.

Finishing. Finish machine-made lace by pressing on the wrong side over a flannel pad before the lace is quite dry. Hand-made lace that has been well pinned out will only require slight pressing on the wrong side over a flannel pad when dry. The pattern of the lace can be raised with a punching iron.

Lace curtains. Shake. Fold large curtains together and tack to prevent tearing during washing.

Steep overnight in water containing a little dissolved soap, or soap powder. Squeeze out by hand.

Cleanse by careful kneading and squeezing in warm soapy water, or by suction washing.

Rinse thoroughly in warm waters.

White curtains can be boiled, rinsed, and blued. Cream curtains can be tinted by use of solution of boiling-water dye (bracken-leaf brown, giving a cream tint) or by use of ecru starch.

Starch is used as the stiffening agent for lace curtains; the strength depending on the thickness of the curtain. Average proportion 1 : 6.

Remove moisture by hand; squeezing curtains that have been tinted should be squeezed very thoroughly so that streaking is avoided.

Dry in shape. Long curtains can be dried on a taut clothes line, pegged as for sheets; or on a ceiling drying rack. Curtain drying frames are used in laundries to keep curtains straight. They cannot be considered pieces of household apparatus, as large lace curtains are so little used. Curtains should be finished when almost dry by pressing on the wrong side. They should be aired thoroughly before being stored, to prevent the possibility of mildew.

Long curtains should be lightly folded together twice lengthways, then as few times across as possible, this depending on the storage space.

Dry cleaning lace. White lace can be dry cleaned by sprinkling well with french chalk, or carbonate of magnesia, and wrapping with this for several days. Shake out.

Coloured lace, e.g. lace dresses, can be dry cleaned in a grease solvent. See Chapter XVI.

Black lace. This becomes discoloured through age and wear.

Large articles can be re-dyed.

Small pieces of valuable black lace can be treated with either deep blue water, or a strong infusion of tea. Gum water can be added to either of these if the lace requires stiffening.

Metal lace. This is difficult to treat as the stain is a metal tarnish. A paste of french chalk, or carbonate of magnesia, and a grease solvent can be spread over the lace, allowed to dry, and then rubbed and brushed off.

CHAPTER XV

TREATMENT OF SPECIAL ARTICLES

Eiderdowns. Eiderdowns that are in a good condition should be dry cleaned. This keeps the cover in a satisfactory condition for a long time, and the cost of cleaning is small. Eiderdowns that have been used very much, and are very soiled, can be washed successfully. The disadvantage of washing is that it will remove dressing from thin covering fabrics, so they will be no longer impervious to penetration by the down. This is very undesirable, especially when there is no inner case for the down. Use suitable apparatus for the washing: either a washing machine or a dolly tub, and suction washer. Cleanse by suction washing in softened soapy water at 100°–110° F. Use as many waters as necessary to cleanse, and rinse very thoroughly. Coloured covers can have an acetic acid or vinegar rinse if necessary. Remove moisture between washing and rinsing by careful wringing with a loose tension. Squeeze out the water, press out air, and rearrange down as necessary before passing between the rollers; attention to these points will prevent splitting the cover or stitching. Shake and re-arrange the down, and place in such a position that the eiderdown is surrounded by a current of warm air, e.g. on a double clothes line out of doors in suitable weather, or over several bars of a ceiling airer. Shake and re-arrange the down several times during drying. Finish the cover by light steam pressing when the down is quite dry.

Swansdown. Shake the swansdown in warm soapy water until it is clean. Shake in clean warm water until thoroughly clear of soap. Allow to drip from the rinsing water, hang small pieces up to dry without any squeezing, fold large pieces or trimmings in a dry cloth and press out the moisture very lightly. Dry in warm air, shake frequently during drying.

Feathers. These can be dry cleaned or washed. The method of washing is the same as for swansdown. After rinsing shake in a thin mixture of raw starch and cold water. Allow to drip from this, and

dry in warm air. Shake during drying; as the starch grains shake out, the feather separates. Brush lightly to remove any excess starch grains. Moisten the edges in steam and curl with a blunt knife.

Babies' clothes. Materials made from all the textile fibres are used for babies' clothes. These should be treated by the method that is suitable for each fabric. These garments are washed frequently, so all washing must be done carefully.

The following are points of importance in connection with some fabrics:

1. *Bleached cottons.* Excessive use of soda and washing powders containing soda should be avoided, as this yellows the cotton and gives it a harsh surface. Borax, pure white soap, or pure soap flakes should be used in cleansing. Starch should not be used in any part of a garment that will come near a baby's skin. Drying should be out of doors whenever possible.

2. *Woollens.* Very careful washing each time is imperative, because woollen garments have to be washed so frequently. All points impressed in the treatment of wool should be carefully followed. Small garments, e.g. socks, caps, should be filled with crushed paper, so that the layers of wool are separated; the wool will not take too long to dry, and the articles will dry in shape. Woollens should be shaken during drying, so that little finishing is needed.

3. *Diapers.* Babies' diapers should be washed daily. They should be steeped in a bucket in cold water, and rubbed in this before being wrung out for washing. Wash by friction in warm water, softened with borax, and use a pure white soap, or good soap flakes. Boil in water softened with borax and white soap, using a pan or enamel bowl kept for this purpose only. Rinse very thoroughly in warm, then cold water. Dry outside whenever possible. Air very thoroughly before they are used again.

4. *Finishing.* A sleeve board and a skirt board are helpful in the finishing of babies' clothes; they save much time. Small irons are very useful, and would be a good investment where the household iron does not possess a narrow point.

Chamois leather gloves. Chamois leather gloves vary in colour. The white and natural leathers wash well. Coloured chamois leather may wash, but if any doubt is felt that the dye may wash out and the colour of the glove be spoilt, the gloves should be dry cleaned. Gloves that are sold as spongeable should never be immersed in water, they

must be surface sponged with a piece of absorbent material, e.g. flannel, and warm soapy water.

Chamois leather is treated like woollens and silks. Stains can be removed by the use of stain removal agents used in solution; hydrogen peroxide should be used for any bleaching that is attempted. Gloves should be cleansed by very thorough squeezing in warm soapy water; soap containing a grease solvent is very effective to use for the soap solution. Very soiled finger-tips can be lightly brushed. Rinse in warm water and give a final rinse in clean warm soapy water to keep the leather soft. Wrap in a cloth and wring, placing the finger-tips to the rollers. Gloves with buttons must be squeezed, folded in a dry cloth and moisture pressed out. Stretch the gloves into shape, and peg on a clothes cord, or pin securely through a cloth, and hang in warm air to dry. Chamois leather should dry slowly, and it must never be placed near heat to dry quickly or it will harden and shrink. Rub occasionally during drying to keep the skin soft. Stretch by drawing on to the hand, or by using glove stretchers. Gloves can be pressed with a warm iron; this gives a smooth surface that will not soil too quickly.

Weather-proofed coats. These must be divided into two groups for treatment: the rain-proofed fabric coats, and the mackintoshes or rubber-proofed coats.

Many different fabrics are treated to give them rain-resisting properties. Coats made from fabric of this kind can be dry cleaned with any grease solvent; this retains the weather-proofing. They can be sponged by any of the methods suitable for treatment of heavy materials. (See Chapter XVI.) If the sponging is allowed to penetrate the fabric too thoroughly it may impair the weather-proofing. They may be washed by suction washing, but this will definitely impair the weather-proofing. After thorough cleansing and rinsing, they should be dried in the open air in a slight breeze. They should be finished by steam pressing when dry. (See Chapter X.) This type of proofed coat can be cleaned and reproofed by commercial dry cleaners. Some firms who manufacture these coats have reconditioning departments to which soiled coats can be sent for treatment.

Mackintoshes being rubber-proofed must not be touched with anything that will dissolve the rubber, e.g. grease solvents. Grease marks on this type of coat should have french chalk spread thickly over them; leave for a short time to allow the chalk to absorb the grease,

then brush it off. Mackintoshes that are going to be washed can have grease marks treated with eucalyptus oil to dissolve the grease. This may leave a mark, and if the whole coat is not to be washed it is advisable to try a dry powder. The best way to clean these coats is to make a warm concentrated solution of any good cleaning soap. Lightly scrub or wash the whole of the coat with this concentrated solution. The type of material covering the rubber will decide how drastic the cleansing action may be. Treat the whole of the coat evenly. Rinse very thoroughly in warm waters. The best way to do this is to rinse in a sink, so that plenty of water passes over the material, and rinse out all the soap. If this is not done, white streaks will appear when the coat has dried. Lift the coat on to a wooden hanger, and allow to drip into the sink or in some convenient place, and hang in a draught till dry. Keep this type of coat as uncreased as possible throughout the whole of the washing process, and straighten during drying, as it cannot be pressed in any way.

Leather coats. These are required to be uniform in colour, and surface finish. Accordingly, the leather is treated specially with colouring pigments and enamels or cellulose lacquers. This makes any attempt at cleaning leather coats very difficult, and amateurs are advised not to be too ambitious.

Leathers that are guaranteed waterproof may be surface sponged. Use a piece of flannel saturated with warm soap solution made from a good cleansing soap, or use saddle soap, which can be bought in reliable brands from leather merchants. Sponge the surface evenly, working over a small portion of the coat, then rinse evenly with another flannel wrung from clean warm water. Hang in a draught to dry. Treat the surface when dry with any good polishing cream. Renovating this type of coat can be attempted with any of the patent leather renovators or leather dyes that are on the market. To secure an even result the leather must be carefully touched during such renovation. Faded or much used coats can be dyed quite successfully by the amateur by careful and even application of leather dyes, followed when dry by good polishing with a suitable cream.

Leathers that are not guaranteed waterproof must not be touched with water, as this would probably remove the dye, leaving a light-coloured patch. Very little can be done by the amateur to this type of coat other than thorough brushing, for which a stiff bristled brush or a rubber brush is useful. This is recommended for all suede leather coats, on which any other cleaning may cause either light-coloured or

shiny patches. Soiled coats needing much attention should be sent to commercial dyers and cleaners, who renovate leather coats very successfully.

Stains on leather are difficult to treat. Dry cleaning solvents should not be used for spotting, as they will leave a ' sweal ' unless the whole of the coat is being treated. Cleaning with a powder suitable for the colour of the coat, e.g. natural fuller's earth, rubbing this into stains, leaving a short time, and brushing out is a method that can be tried. Touching the surface of the leather lightly with a piece of emery paper will make shiny marks less noticeable. This must be done by light rubbing in one direction only, and not by drastic rubbing that will damage the surface of the leather. Patent cleaners specially for suede leather are useful. They are similar to india-rubber in appearance and are used for surface rubbing.

Leatherette coats. These are usually rubbered coats made to imitate leather. They must be treated like mackintoshes by sponging with warm soapy water. A cloth or old sponge may be used, but not a brush of any type, as this will spoil the surface of the coat. Thorough rinsing with warm water should follow, and the coat should hang in a draught to dry.

CHAPTER XVI

SPECIAL TREATMENTS

Sponging. Many thick materials that are only surface soiled can be cleaned by sponging. These materials will dry clean, but such treatment may be expensive, and not entirely necessary. Many of these materials will wash, but this may not be necessary for the whole garment, and the risk of loss of colour or shape may be involved.

A suitable sponging solution should be made, taking into consideration the colour and state of dirtiness of the garment that is to be treated. This solution should be applied evenly to the surface with either a piece of material similar to that being treated, or with a pad of flannel. Hang up to dry. Press on the wrong side when quite dry by the method described in Chapter X for pressing heavy woollens.

The following sponging solutions are recommended:

1. Warm blue water for blue serge.

2. Warm water and acetic acid or vinegar for dark-coloured materials. Proportion: 1 tablespoonful to 1 pint.

3. A solution of ½ pint warm water.
    2 teaspoonful salt.
    1 ,, ammonia.
    1 ,, vinegar.
    1 to 3 ,, gum water.

This solution is very useful for all light-coloured materials.

4. Dissolve ½ oz. sal ammoniac in 1 gill of hot water, add this to a quart of warm water. Use this as a sponging solution, or immerse the garment in it for ½ hour, turning and squeezing it occasionally. Follow the sponging or immersion by acetic acid or vinegar sponging or rinsing, using 1 tablespoonful to 1 quart. This is useful for cleansing dark fabrics.

Sal ammoniac is ammonium chloride (NH_4Cl), a neutral salt, and does not affect the colour of the material.

5. Glue wash. Soak 2 oz. glue in 1 pint cold water in an earthenware

jar. Leave overnight. Stand the jar in a pan of water, and heat till the glue is dissolved. Add this dissolved glue to 1 gallon warm water. Retain some of this solution for a last rinse if the material being treated will need slight stiffening. Immerse the garment in this; cover, and leave for ½ hour. Turn twice, each time pressing the glue solution well through the material. Squeeze out and rinse in warm waters. Give a final rinse in clean glue water for materials that have been softened by immersion in water, but omit where a soft finish is wanted. Squeeze tightly or machine wring. Dry, and press when quite dry by the method for heavy woollens (Chapter X).

This is useful for cleaning tweed skirts and similar garments not soiled by greasy dirt, and for canvas sports bags and tennis racquet covers. The latter should have the glue solution applied by scrubbing with a laundry brush. They should be kept straight and flat, rinsed with clean warm water, and given a final brushing with clean glue solution.

The glue forms a colloidal solution that has the ability of keeping dirt particles in suspension.

6. Quillaia bark. Proportion: 1 gill measure of powdered quillaia bark; 1 quart water.

Measure the bark, and put into a laundry pan. Cover immediately with the water. Heat to boiling point, and stew for 20 minutes. Pass through a strainer lined with muslin. The infusion may be used for sponging when it has cooled to the correct temperature, or it may be used for washing.

Quillaia bark (derived from *quillcan*, Chilian verb, 'to wash') is the inside part of the bark of the *Quillaia saponaria*, a large tree of the Rosaceae family, which grows in parts of South America. It can be bought from chemists in a powdered form. It has an irritating effect on the mucous membrane, and causes violent sneezing, so it is advisable to measure it out carefully and cover it at once with water. The bark contains much mineral matter, saponine being the ingredient that is useful to the laundress. It forms a lather which has cleaning action by lowering surface tension, and emulsifying grease. The chief recommendation of saponine is that it has no effect on dyes. The infusion can be used for cleansing, when it has cooled to 100° F., without the addition of soap, for any coloured fabrics soiled with greasy dirt. The solution is of a reddish colour, but this need not restrict its use on thick materials.

Quillaia bark is also known as soap bark, Panama bark or wood.

Dyeing. Dyeing as a means of providing colour has been known probably as long as civilization has existed. Primitive man made use of any part of the vegetation around him that afforded colour; examples of this are the red dye from madder, the blue dyes from indigo and woad. Vegetable dyes were the only ones used for many centuries. They are still used to some extent in the dyeing of fibres for hand-woven textiles. Scientific research has produced chemical dyes that are of good strength, reliable colours, and easy to use. These are prepared from benzene, phenol, and toluene, which are products of the distillation of coal tar.

Home dyeing has always been practised to some extent. It is practised more now, as the modern dyes are so conveniently packed and reliable in use. It can be done successfully by the housewife who is careful and accurate, but there is the possibility of a disappointing result unless thought is given to the work, and it is carried out with care.

Dyeing freshens and brightens faded garments and household articles at a low cost, and so often prolongs their usefulness. Colours of garments and household articles can be changed, so that they fit into colour schemes. The dyeing of large articles should not be attempted unless sufficiently large apparatus can be used, or the result will be unsatisfactory. Small articles can be dyed quite successfully.

Consider the colour, the fibre of the material, and the possibility of stripping colour before deciding on the dye to be used.

Reaction of fibres to dyeing. Vegetable fibres take dyes well, but they need to be heated to boiling point, and kept at that temperature for some time if a deep penetration of colour is wanted. Linen and ramie are more difficult to dye than cotton. Animal fibres take dyes quickly, and at a temperature below boiling point. To obtain a deep penetration of colour in wool it should be kept for a long period at a low temperature. Silk can be heated to boiling point, generally with safety, and this has to be done for silk garments with cotton stitchings, or the stitching will be several shades lighter than the silk.

Viscose rayon, being a regenerated cellulose, takes dyes as easily as cotton, and presents no difficulty in home dyeing.

Cellulose acetate rayon does not dye well with the dyes that are available for the housewife. If a rayon garment is found not to take the dye when in the dye bath, it may be concluded that it is cellulose acetate rayon. Some dyes are sold as being universal for their treatment of fabrics, but even these will not fix on to some cellulose acetate rayons. The method of loading this rayon with sodium silicate (waterglass) can be tried, but this may not be effective always. Dissolve 2 tablespoon-

fuls of sodium silicate in ½ pint of hot water, 150° F. Squeeze the article in this solution and leave for 1 to 1½ hours to allow it to penetrate the fabric. It is important that this penetration should be even, so keep the garment as uncreased as possible, otherwise where creasing has occurred and the fabric is unevenly loaded, streaking will result. All rayon must be dyed at low temperatures, never above 180° F., or the rayon will be weakened and delustred.

Types of dyes:

1. Liquid dyes. These may be of different types, suitable for different materials. Examples are:

Spirit dyes, suitable for recolouring straw hats.

" " " leather.

Concentrated cold-water dyes, suitable for dyeing fabrics that it is not intended to clean by washing, e.g. scarves, evening shoes.

Coloured inks can be used for tinting fabrics not intended to be washed frequently.

2. Paste dyes. Concentrated colouring made up in a paste form suitable for recolouring leather and such material, for which dyes made up with water are unsuitable.

3. Powder dyes. These are made up in a variety of forms, in convenient capsules which dissolve in the dye bath, and firm cartons from which the quantity of dye required can be taken, the remainder being kept with safety in the carton. All these dyes are suitable for dyeing textile fibres. They can be used in cold or warm solutions for tinting, or at the correct temperature for each fibre for dyeing. Some kinds are made up separately for animal and vegetable fibres; some are universal dyers for all fibres; others are made up to fix on animal fibres only, so that mixture fabrics with contrast and effect threads of cotton or regenerated rayon, or trimmings of these materials will not be dyed; some dyes are combined with soap. Powder dyes for stockings are some of the most useful of modern dyes. They are obtainable in a wide range of colours, made up in capsules that dissolve in the dye bath, and are easy to use.

The following directions apply to the preparation and use of powder dyes.

Preparation for dyeing:

1. Fabric. Articles to be dyed must be clean, free from stains, and evenly wet.

A lining may take the same colour as the garment, and if not wanted to be dyed should be removed. Cellulose acetate rayon linings are uncertain in dyeing, and sometimes take up part of the colouring from the dye bath, and so do not match the garment after dyeing.

Buttons and metal ornaments may be spoilt by the heat of the dye bath, so should be removed before dyeing.

Unpick any thick parts, pleats, hems, where thickness of material will prevent penetration of dye.

Strip colour from material if it is necessary. Fabric that is unevenly faded is difficult to dye to a level colour unless it is stripped.

Weigh the material if a dye is being used that requires a certain concentration to a definite weight of material.

2. Stripping, or decolorizing of fabric is only possible for the housewife to a limited extent. Commercial dyers can use stripping agents that are not practicable for the housewife. By the use of these the colour of garments can be changed entirely, but it must be remembered that stripping has a tendency to impoverish fabric. Methods of stripping available for the housewife are the use of oxidizing or reducing bleaches (see Chapter V), or the use of some of the stripping agents made up in small bulk by dye manufacturers and procurable from shops that sell dyes. Sodium hydrosulphite is the most useful stripping agent. It does not harm any fabric. It strips more effectively as the temperature increases; this point must be watched when it is used on wool and rayon.

3. Apparatus. Keep old household enamel bowls and saucepans for dyeing.

Use wooden spoons kept specially for this purpose, or smooth pieces of wood.

Cover tables in some way as all dye spots can only be removed by some method of bleaching. Keep old oilcloth for this purpose.

Protect dress and hands by rubber apron and gloves.

4. Dye. Purchase the quantity of dye required before beginning work.

Prepare the dye according to directions and colour required. Two or more dyes can be mixed to give colours and shades not obtainable. If more than one article or garment is being dyed and all are required the same shade, make up two or more dye baths, identical in quantity of dye and water. Heat to the same temperature and keep in the dye the same length of time.

Dissolve the dye completely in hot water. It is most practical to

do this in some water in the dye bath. Where a capsule is being dissolved, this will take longer than powder from a carton. It is *most important* that the capsule should be dissolved completely, or streaking will result.

Strain the dye through muslin into an enamel bowl, and return to the dye bath.

There must be sufficient dye in the dye bath to allow the whole of the article being dyed to float easily, so make up the dye bath with the required quantity of water.

Test the colour of the dye with a piece of material similar to that being dyed, or a piece of a similar fibre. Remember that the dye dries several shades lighter than it appears when wet.

Method of dyeing. Shake out the article.

Lower into the dye bath.

Begin to move at once with two wooden spoons, or pieces of wood, and keep in continual motion the whole time fabric is in contact with dye.

Keep in the dye bath till the fabric has developed the required colour, at the correct temperature for the fibre.

Remove into a sink by using the dye spoons.

Rinse according to the fabric till no dye leaves it.

Keep the dye till the article has dried, in case it is needed again. Dye can be stored in glass bottles, for future use, as it keeps well.

Squeeze out, dry and finish according to fabric. Care should be taken during drying to protect clothes cord, clothes horses, and to see that the dyed article does not touch other things lest it should mark them. This is less likely to happen if rinsing has been thorough. Properly dyed and rinsed articles can be squeezed or machine wrung. If streaking has occurred it will have done so previous to the rinsing, and articles to be washed afterwards must have a penetration of the dye that will stand subsequent washing and wringing.

Depth of colour in fabrics can be assisted by adding to the dye bath 1 tablespoonful of salt per gallon for vegetable fibres, or 1 tablespoonful of acetic acid per gallon for animal fibres.

Success in home dyeing. Success in home dyeing depends upon:

Correct selection of dye for colour and type of fibre.

Dye being in complete solution.

Sufficient dye to float the article in the dye bath.

Correct condition of material.

Continual movement of material the whole time it is in contact with the dye.

Correct temperature and length of immersion.

Thorough rinsing.

Dry cleaning. Dry cleaning is the term used to describe the cleaning of fabrics in certain liquids which act as grease solvents, and with dry powders which act as grease absorbents.

The term 'dry' is used because the solvents do not penetrate fibres and wet them in the same way as water. Hence fibres retain their shape and size as they do not absorb the solvent.

Most of the materials used in the finishing processes of manufacture of fabrics are soluble in water, but insoluble in dry-cleaning solvents; hence stiffness and feel of fabrics are not altered by dry cleaning.

This type of cleaning is based on the fact that much of the dirt in fabric is held by grease. When this grease is removed by absorption or solution, the dirt is removed mechanically.

Dry cleaning by use of absorbents. This method is suitable for removing grease spots from all types of fabrics; for general treatment of light-coloured fabrics that are evenly soiled; and for articles like furs and dark-coloured gloves that are best not immersed in a dry-cleaning solvent.

Different absorbents and their use:

Powdered magnesia (magnesium carbonate).

French chalk.

Fuller's earth, bleached.

Commercial dry-cleaning powders sold in small quantities in perforated topped tins.

Used on any light-coloured fabric, white lace, white embroidery, white furs, white felt hats, most useful for any clean grease marks, such as machine oil.

1. Shake or brush loose dust from the garment.
2. Spread a thick layer of the absorbent powder over it, and rub in lightly.
3. Leave for ½ hour to allow the powder to absorb grease.
4. Evenly soiled fabrics can be wrapped up with the powder and left longer.
5. White fur and felt can be cleaned more effectively if a paste is made of any of the white powders and a dry-cleaning solvent such as

carbon tetrachloride. This should be spread lightly over the surface of the felt or fur, left to dry, then be brushed or shaken out.

6. Shake off the powder on the surface that has formed a mass with any grease, then shake or brush the whole garment.

7. French chalk is useful for finishing white kid gloves that have been cleaned with a dry-cleaning solvent. Rub it into the gloves whilst they are still damp with the solvent, leave until dry, then shake and beat out.

Fuller's earth, natural powder. This is useful for suede gloves that might be spoiled by a dry-cleaning solvent through the solvent removing dye. Use as described above for the white absorbent powders.

Bran. This is useful for cleaning dark-coloured felt and velour hats, and dark furs.

1. Heat the bran to dry it and improve its absorbent powers.
2. Rub well into the articles being cleaned.
3. Leave for ½ hour.
4. Shake and brush out.

The advantage of a dry-cleaning powder as compared with a grease solvent for absorbing and cleaning grease marks is that no 'sweal' or ring is left on the fabric. Thus it is suitable for spotting, but it is not recommended for articles very soiled with greasy dirt.

Dry cleaning by use of a grease solvent. The solvents used for dry cleaning can be classed as:

Inflammable: Aviation petrol, benzine.

Non-inflammable: Carbon tetrachloride, benzene, commercial preparations.

The principle underlying the use is the same in both cases, but the method of use varies because of the inflammability of petrol.

Dry-cleaning soap. Commercial preparations of dry-cleaning soaps are available. The use of this soap increases the cleansing power of dry-cleaning solvents. These soaps are manufactured to be easily soluble in a dry-cleaning solvent. A very small amount should be spread over grease spots and very soiled parts before the garment is immersed for cleansing.

Use of inflammable solvents. This work must always be done out of doors, or in some place where there is good ventilation, and not in any place where there is a naked light or where petrol vapour can travel to a naked light. Petrol and petrol vapour are highly inflammable,

and this point cannot be too well remembered in using it for any dry-cleaning operation.

1. Prepare the garment by shaking, brushing, or spreading on a little dry-cleaning soap where necessary.

2. Have sufficient petrol in bowls to clean the garments by hand squeezing, or by use of a suction washer, and clean petrol to rinse. During this dry-cleaning process, owing to the solvent evaporating rapidly, and dissolving grease, it has a very drying effect on the skin of the hands. Hence it is pleasanter to use a suction washer and only squeeze out by hand. After cleaning is completed, wash the hands and rub with glycerine or a good skin cream.

3. Squeeze out as much petrol as possible, then wrap in a dry towel or cloth and beat.

4. Hang outside to dry.

5. Press when thoroughly dry.

6. Hang in a draught for several days till the garment is free from the smell of petrol.

7. Leave used petrol in covered bowl outside to allow the dirt to settle. This will take some time to effect; it can be hastened by shaking into the petrol any household cleaning powder that is known to contain a high percentage of silicate. After settling, the petrol can be carefully poured off the top, and the sediment thrown over open ground. It should not be thrown over grass, or put down drains. An alternative method is to strain through chamois leather, but the former method of allowing to settle is the more practical. This reclaimed petrol can be used as the first petrol for the next cleaning.

8. Petrol should be stored in a closed tin in an outhouse.

Use of non-inflammable solvents. These solvents are safer to use in that they are not inflammable, but they have anaesthetic properties and must be used in a well-ventilated room if they are being used open in bowls. They are very suitable for use in dry-cleaning tumblers or cylinders, and apparatus of this type is available for the housewife. This solvent is much more expensive than the inflammable solvent; some of the commercial preparations are too expensive for any purpose other than spotting; other preparations are on sale in larger quantities, procurable in cans, at a price that is possible for use in cleaning garments by complete immersion. This solvent squeezes out of fabric better than petrol, so that there is not so much loss in cleaning. Its use in special apparatus is very economical, as a smaller quantity will

clean a garment when it is revolved in a tumbler or cylinder than will be required to clean the same garment in a bowl.

1. Prepare the garment by shaking, brushing, spreading on dry-cleaning soap, or spotting with special spotting liquids.

2. Clean by squeezing in the solvent in a bowl or by revolving in a special dry-cleaning apparatus.

3. Squeeze out.

4. Hang up to dry.

5. The garment will dry quickly, it can be pressed at once, and used quite soon as no smell is left in the material.

6. Pour the used solvent into a jar and cover. Allow to settle; this is effected quickly by use of special powder sold for reclaiming, and through its use there is little loss of solvent. Some dry-cleaning apparatus is specially constructed with a filter for the reclaiming of solvent.

Advantages of dry cleaning. Dry cleaning is possible for many fabrics for which washing is not suitable, and for many articles that are unwashable, such as fur, felt, and dark skin gloves.

Crêpe fabrics of any fibre, particularly those with a deep crêped surface, can be cleansed very successfully by use of a dry-cleaning solvent. This will cause less shrinkage than washing.

Velvet, and any fabric with a velvet-pile pattern, should be dry cleaned, unless such material is guaranteed washable. The pile is flattened by washing, but not flattened by dry cleaning. Fabrics finished by moiré marking should be dry cleaned, as washing removes this marking.

Printed satin and silk with much colour in the pattern may be quite spoilt by washing; whereas, though some colours may be slightly affected by dry cleaning, it will be to a much lesser extent.

Dry cleaning is the best method of cleaning any garments with pleats; it does not remove the pleats, as it does not wet the fabric. Similarly creases are not removed by dry cleaning, they must be pressed out of garments with a warm iron after cleaning.

Disadvantages of dry cleaning. Cost of cleansing agents more than for washing.

Smell of inflammable solvents remains in clothing for a long time, especially in woollens.

The solvent only acts on dirt held by grease, so some stains may be left after cleaning, and these will have to be spotted with water, e.g. perspiration, any water solution stain like tea, coffee, lemonade.

Disinfection. Disinfection of clothing is necessary in the home as a precaution against the spreading of infectious disease by bacteria or other organisms.

Fresh air, sunlight, dryness, and cleanliness are conditions in which bacteria are less likely to be prevalent.

Clothing to be disinfected can be divided into two groups:

1. Those that can be disinfected by boiling.
2. Those that must be disinfected by means other than boiling.

Disinfection of clothing by boiling. This method is suitable for all bleached cottons and linens, and would be the method used to disinfect bed linen and personal garments of suitable materials. The use of paper handkerchiefs is to be recommended where practicable; where this is not practicable handkerchiefs should be steeped with disinfectant in the water, washed separately, then boiled with the other clothing from the infected person. All bed linen that has been used by an infectious person and has to be sent to a public laundry must be steeped in a disinfectant solution first, e.g. 3 per cent carbolic solution for 12 hours, machine wring and dry. The laundry must be notified of the state of this clothing.

Home treatment for infected clothing would be as follows:

Clothing should be steeped for 12 hours immediately it has been taken from use. Examples of solutions that can be used for steeping are:

Carbolic acid	1 tablespoonful	to	1 quart.
Lysol	1	,,	3 quarts.
Izal	1	,,	1 gallon.

Machine wring.

Wash by mechanical means.

Put into the boiler in softened soapy water, allow to come to boiling point, and boil for 1 hour.

Rinse very thoroughly.

Dry out of doors.

Clothing treated like this should be free from any infection.

Disinfection of clothing that cannot be boiled. This clothing may be disinfected at home at the same time as the sick-room by fumigating with some chemical compound that emits a penetrating and disinfecting gas.

The alternative method is to have clothing disinfected at a public disinfecting station. At this place the clothing is subjected for

30 to 40 minutes to steam under pressure in a closed chamber. The average temperature used for this is 240°–250° F. at 15 lb. pressure.

Home methods of disinfecting would be as follows:

Formaldehyde fumigator. This consists of charcoal over a tin containing paraform. The heat given by the charcoal to the paraform causes the generation of formaldehyde gas, which is a powerful disinfectant. Spread the clothes on clothes horses, place these in the centre of a room. Place a bucket of hot water near to keep the air moist, as formaldehyde gas penetrates better in moist air. Place the formaldehyde fumigator on a shovel or in a tin, as a protection against fire being caused, at some height from the floor. Heat the charcoal, and place over the paraform. Close the room and leave for 5 to 6 hours. The average cost of a fumigator of this type is 1s. 6d.

Other methods by which formaldehyde gas is generated are:

1. By spraying with a solution of 1 tablespoonful of formalin in a pint of warm water.

2. By pouring ½ pint of formalin over 5 oz. of potassium permanganate in a metal dish, and leaving surrounded by the clothing in a closed room for 5 to 6 hours.

3. By use of a formic lamp, where the paraform is in tablets. These are placed in a lid, over a night-light, and the apparatus put in a central position in the room with the clothing round it. The gas evolved from the paraform penetrates the clothing. This apparatus must be used in a closed room. The advantage of this method is that a varying number of tablets can be used according to the quantity of clothing to be disinfected.

Formaldehyde gas is possibly the best disinfectant of its type. It is a satisfactory germicide when used in warm moist air. It has the advantage of not being harmful to clothing or to the contents of rooms in which it may be used.

Disinfection by dry heat. Disinfecting by baking is not applicable to clothing. After certain illnesses it is necessary to burn bedding and clothing.

CHAPTER XVII

ROUTINE OF THE FAMILY WASH. EQUIPMENT FOR HOME AND INSTITUTIONAL LAUNDRYWORK

THE cleansing of clothing is a factor in life with which every one is concerned to a greater or lesser degree. It is of first importance for reasons of health, it is a significant addition to the social amenities of life, and it is the economic factor in the renewal of clothing to prolong its usefulness.

The outlook on laundrywork has changed considerably during the present century, but the cleansing of clothes still forms an important part of household work. Formerly all the household washing was carried out at home. The washing day was regarded by the family with feelings of pleasure or the reverse in direct ratio to its organization. The housewife had to arrange for the whole of the washing to be done. The arrangement depended upon the size of the wash, the apparatus available, the type of house. All the apparatus used entailed much work, this called for a large energy output on the part of the housewife or her helpers. The fabrics used were mostly bleached fabrics requiring good laundering to retain their pleasing whiteness. The place where the washing was carried out was not infrequently an outside wash-house, which caused much waste of time and energy in walking to and fro, if the worker had to attend to other housework and cooking at the same time. There is no longer need for this condition to exist anywhere, as modern labour-saving equipment can transform even the most inconvenient of working places into efficient time- and energy-saving units, if thought is given to the planning, placing, and type of equipment.

Several factors have influenced this change. The desire for more leisure, along with the innumerable ways of using this leisure, has made people look for means of acquiring it. The inability to obtain help in the household at the small cost at which it was obtained formerly has furthered the cause of labour-saving apparatus, washing agents, and the development of power laundries. The introduction of apparatus used for washing large quantities of clothing, at first hand-operated, and latterly electrically driven, has revolutionized this part of the work.

TABLE A

Process	(1) Bleached Cotton and Linen	(2) Unbleached Cotton and Linen	(3) Wool
Preparation.	Remove stains. Repair table-linen.	As (1).	Remove stains. Repair ladders in knitted fabric, thin places and large holes in large woollens.
Steeping.	Up to 24 hrs. in cold soft water, hard water softened with soda.	Coarse steeped as (1). Table-linen not steeped unless very soiled, then a short steep, especially if there is colour on it.	New wool that has been sulphur bleached in a warm slightly alkaline water for ½ hr. immediately before washing.
Cleansing: (*a*) Temperature of water.	110° F. up to 212° F.	Coarse as (1). Table-linen with colour 100° F. to 110° F.	100° F. to 110° F.
(*b*) Cleansing agents.	Any reliable laundry soap, soap flake, soap powder. Soda.	Coarse as (1). Table-linen. Any reliable laundry soap or soap flake Borax.	Any reliable laundry soap or soap flake. Borax. Ammonia for white wool only.
(*c*) Method.	Friction or suction.	Coarse friction. Table-linen suction or kneading and squeezing.	Suction or kneading and squeezing.
(*d*) Boiling.	15 min. in softened soapy water.	Coarse as (1). Table-linen not practised.	Not practised.
(*e*) Rinsing.	1. Hot, 110° F. 2. Cold.	Coarse and table-linen as (1).	Two rinses of 100° F.
Blueing.	Pale cold blue water.	Not practised.	As (2).
Stiffening.	Boiling-water or cold-water starch	Table linen. Boiling-water starch.	Not necessary.
Removal of moisture.	Hand or machine wring.	As (1).	Squeeze or machine wring carefully.

(4) SILK	(5) RAYON	(6) COLOURED FABRICS
Remove stains. Repair ladders in knitted fabrics.	As (4).	As (4).
Very soiled light colours in a warm borax, steep ½ hr. immediately before washing.	Not practised as it lessens tensile strength of rayon.	Not practised as long immersion in water may be a cause of colour 'bleeding.'
As (3).	As (3).	As (3).
As (3).	As (3) + any reliable soap powder for very soiled light colours.	Any reliable laundry soap or soap flake. Borax.
As (3).	As (3).	As (3).
As (3).	As (3).	As (3).
1. Warm rinse of 100° F. 2. Cold rinse.	As (3).	As (4) + acetic acid if necessary.
As (2).	As (2).	Dark blue and black cotton can be blued.
Gum water.	Gum water.	Boiling-water starch or gum water according to fabric.
As (3) or beat in a dry towel.	Squeeze and beat in a dry towel.	According to fabric as given (1) to (5).

TABLE A—*continued*

PROCESS	(1) BLEACHED COTTON AND LINEN	(2) UNBLEACHED COTTON AND LINEN	(3) WOOL
Drying.	Outdoor in sun.	Outdoor in shade.	Outdoor in shade. Fabric that will stretch supported
Finishing :			
(*a*) Condition.	Unstarched: Half dried. Starched: Dried, damped, rolled down half hour.	As (1).	Knitted and thick: Dry. Thin woven: Slightly damp.
(*b*) Method.	Mangling. Ironing. Pressing or steam pressing. Calendering. Right or wrong side.	Coarse: Mangling. Table linen: Ironing on wrong side	Knitted, Thick, Woven: Pressing or steam pressing. Thin woven: Ironing right or wrong side according to colour and surface finish.

The initial cost of some of this apparatus is high, but it saves time and energy, is efficient in use, and constitutes an economy to the family budget eventually. Houses as now built have little space allowed for storing laundry apparatus, so the apparatus must combine the saving of space with efficiency. Hence apparatus that will serve a dual purpose has received much attention in construction, and very useful types are available. Modern soaps, and many of the washing powders sold specially for use with clothes, are manufactured from the point of view of saving time, without damage to fabric. Modern fabrics, as contrasted with those formerly used, require much less work in cleansing and finishing. This point has been stressed throughout the treatments given for each textile fibre.

The section of the community that has little or no accommodation for washing has not been overlooked. Municipal corporations have built and equipped public washhouses in working-class areas, where washing can be done with ease at a low cost. These vary in details of construction, but all have either washing sinks or washing machines with a continual hot-water supply, mangles, or hydro-extractors for

(4) Silk	(5) Rayon	(6) Coloured Fabrics
Cultivated: Half dried and rolled down. Wild: Dried completely. Thin: Rolled down.	Woven: Half dried in shade. Knitted: Dried carefully with support if necessary.	Dried quickly in shade to correct condition for finishing.
Cultivated: Evenly damp. Wild: Dry.	Knitted: Almost dry. Woven: Slightly damp.	According to fabric as given (1) to (5). Doubtful colours finished as soon as correct condition is reached.
Ironing: Right or wrong side according to colour and surface finish.	Knitted: Pressing or ironing. Woven: Ironing right or wrong side according to colour and surface finish.	Pressing or ironing according to fabric. Dark colours on wrong side.

wringing, some type of drying cabinet where drying is done speedily, and finishing equipment, such as mangles electrically driven, and irons with adequate ironing space per person. This type of accommodation where all washing can be started and completed in 1 to 2 hours must make all the difference between comfort and discomfort for people living in small houses.

The power laundry has developed very much both in machinery and in methods of dealing with fabrics. It has washing machines with suitable cleansing action for different fabrics, which wash a large quantity of clothing at one time, hydro-extractors which remove moisture speedily from a large bulk of clothes, multi-roll ironers that finish large quantities of articles quickly and efficiently at a low running cost, and steam presses and finishing machines of all types to deal with finishing processes speedily. Owing to all this, well organized laundries can produce efficient work and charge the housewife for it at a low cost. This has had a remarkable influence on household washing. Many people still prefer to have all their clothes washed at home. There is no disputing the fact that they can have more individual

attention, there is not the risk of loss or damage, and stains can be treated. This is still advisable for valuable or fragile articles, and any fabrics of doubtful colour. Other people take advantage of the economical laundry services for the washing of all heavy household articles, only laundering at home such articles as need particular or special treatment, or those for which laundry charges are high.

Routine of a family wash. Methods suitable for the treatment of all the different textile fibres have been given. These have been tabulated and can be compared in Table A. It is not proposed to say anything more regarding different treatments.

The actual routine will depend upon many factors, such as size of wash, type of materials it includes, type of equipment, drying accommodation, number of workers.

Good organization is the prime factor, on this depends the whole success of a family wash. This calls for methodical planning and preparation.

Washing should always be done at the beginning of the week if possible. It is ideal to prepare on Monday, and wash on Tuesday, but this may not be possible always. Washing at the beginning of the week allows ample time for drying, finishing, airing, and mending before the next week-end.

Preparation can be divided as follows:

1. Clothes.
2. Laundry stores.
3. Washhouse and apparatus.
4. Housework and meals.

1. *Clothes.* Collecting, mending, and sorting.

Collect the clothes and sort into groups according to fibre. Repair anything that is necessary, e.g. table linen, ladders in knitted fabrics, large holes or thin places in heavy woollens. Treat stains as required.

Steeping. Separate bleached and unbleached cottons and linens according to use and texture, and steep 24 hours.

No other fabrics are steeped for any long period previous to washing.

2. *Laundry stores.* All stores required for washing should be in the house previous to the washing day.

There should be a good supply of well-dried soap for friction washing. A good plan for those who cannot afford to buy a large amount of soap at one time is to buy one bar each week, and so gradually accumulate a store. This should be stored on a shelf to dry. Soap solution can be prepared ready for dissolving early on the washing day.

3. *Washhouse and apparatus.* The place where washing is to be done should be clean. An outside washhouse should be whitewashed once or twice a year according to use and district.

All apparatus should be clean and in working order.

4. *Housework and meals.* Adequate meals for washing day should be planned ahead.

Only necessary daily work should be done.

Routine on the wash day:

Preparation:

1. Start work early.

2. The first consideration is the heating of water for washing; this must be attended to early. If the supply is circulated from a boiler at the kitchen range, the fire must be lighted and dampers arranged so that the water is heating. If a wash boiler is to supply the water, it must be filled and lighted early. A supply from an automatic water heater is ideal, but even with this the wash boiler for boiling bleached clothes will have to be filled and lighted.

3. Dissolve the soap solution.

4. Make boiling-water starch and dilute to 1 : 1 strength.

5. Soften the water in the boiler unless the first water is wanted for washing woollens, silks, rayons, and coloured clothes.

6. Put up the clothes cord, and leave clothes pegs ready for use.

7. Machine wring clothes from steeping if the bowls are required for other washing first, and leave them in a bowl or tub that is not being used. Leave steeping until they are to be washed if the tubs or bowls are not needed.

Routine of fibres:

1. Woollens should be washed first whilst the water is heating, and before any washing soda is put into the boiler water if it has to be used. Woollens take long to dry, and should not be left wet, therefore they should have all the time possible for drying. Woollens should be washed first in the summer so that they dry before the hottest part of the day.

2. Silks and rayons may be washed next, depending on the water supply, and the quantity of these articles. When there are few of these articles, and a large amount of bleached articles to be boiled, it may be a better plan to wash some of the bleached articles and put them in to boil. This can only be done where the water is soft, or there is a circulated supply for washing the silks and rayons.

TABLE B

Process	(1) Homes that can Afford Cheap Equipment	(2) Homes that can Afford Hand-operated Equipment
Storing soiled linen.	Limited supply of clothing, so washed weekly. Wicker clothes basket.	Clothes bag, or wicker clothes basket used during washing operations.
Steeping.	Washing tub, metal bath or bowl.	Washing baths, or bowls. Washing machine.
Washing.	Cold water supply only. Gas, or fire-heated wash boiler. Dolly tub and suction washer. Metal bath or bowl used in steeping. Small wringer or mangle.	Circulated hot-water supply from kitchen range or independent water heater. Hand-operated washer and gas-heated boiler or hand-operated washer convertible to a gas boiler. Washing baths and bowls used in steeping. Wringer on washing machine.
Rinsing. Blueing. Starching.	Above as for washing. China basin for starch-making.	Washing baths as above or washing machine used for rinsing and blueing. China making for starch basin.
Wringing.	Wringer or mangle as above in washing.	Wringer attached to washing machine.
Drying.	Clothes line, pegs, prop. Wicker clothes basket. Ceiling airer in kitchen.	As (1)
Finishing.	Kitchen table. Old blanket and sheet from household use. Flat irons heated on gas ring over metal sheet, or in front of kitchen fire on metal shield.	Kitchen table + cheap collapsible skirt board and sleeve board. Flat, gas, or electric iron.

3. Coloured cottons may be washed next or between successive washings of bleached clothes, but only if the water is soft or the supply a circulated one, otherwise the coloured cottons must be washed before the boiler water is softened with any washing soda.

4. Bleached cottons and linens are washed in successive groups, beginning with the table linen. Personal garments should be washed next; these may consist principally of aprons and similar articles, since

(3) Homes that can Afford Mechanical Equipment	(4) Institutional Laundry
Linen cupboard. Linen basket.	Wooden bins.
As (2).	Washing machine as first part of cleansing process, or 'Breakdown.'
Circulated hot-water supply from kitchen range or independent water-heater. Electric washer and wringer. Gas or electrically heated boiler. Washing baths and bowls used in steeping.	Steam-heated water supply. Rotary washing machines in which all washing processes are carried out.
Washing machine used for rinsing and blueing. China basin for starch-making.	All processes carried out in the washing machine.
Wringerattached to washing machine.	Hydro-extractor.
As (1). Household size of drying cabinet.	As for outdoor drying. Drying room.
Unit ironing table. Firm wood or metal sleeve board. Electric iron, or electric calender to electric washer.	Electric irons. Electric calender. Steam-heated presses.

few undergarments are now made of bleached fabrics. Handkerchiefs should always be washed separately and boiled with the personal garments or the bed linen. The bed linen would be washed next, the household cloths and coarse cloths last. Each group should be boiled, the next group being washed ready to go into the boiler whilst one group is boiling.

Hang all clothes out to dry as they are ready, and take down when

they are in the right condition for finishing. Starched articles should be dried completely.

Wash and dry apparatus.

Tidy the washhouse and wash the floor, using the water from the wash boiler.

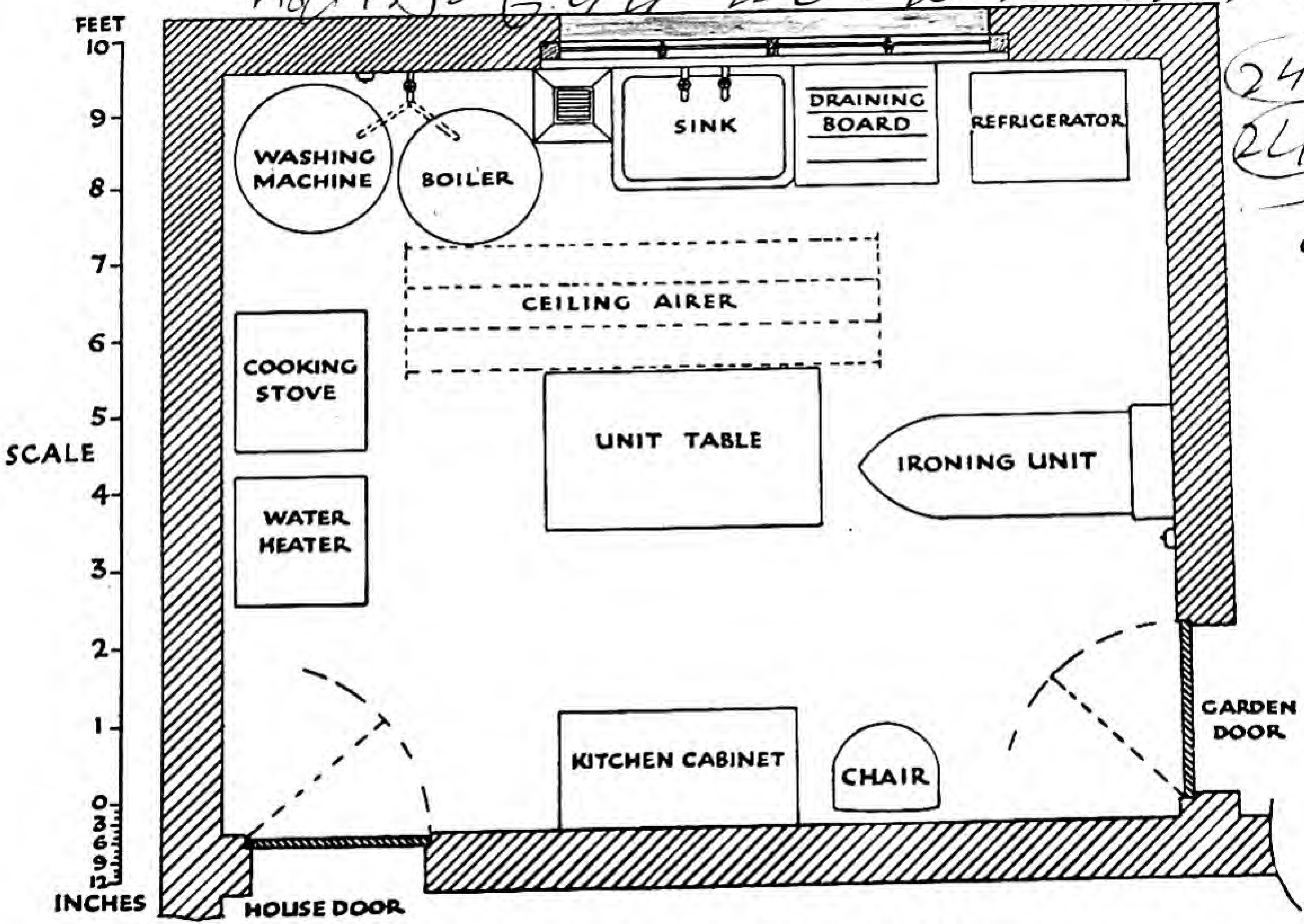
Finishing. Woollens, silks, rayons, household articles to be finished by mangling, and handkerchiefs can be finished on the washing day. Starched articles can be finished if they have dried, and there is time to allow of their being properly damped. If not these will be damped, and finished the next day. Hang everything up to air and allow to air well before putting away.

Comparative washes. The following tests have been carried out on twenty pieces of soiled work, which included household articles and personal garments. In one wash electrically driven washer and wringer were used, with electrically heated iron and calender for finishing. Hand-operated washer and mangle, with flat irons heated by gas, were used in another wash. It was found that the same amount of cleansing material was used in both washes. The length of time taken for the wash using electrical apparatus was 3 hours at an approximate cost of 7d., calculating 2d. per unit of electricity. The wash where hand apparatus was used took 4 hours at an approximate cost of 6d., gas being calculated at 8d. per therm. The higher cost of the former wash was compensated for by the shorter time taken, and the lack of fatigue on the part of the workers as compared with those doing the latter wash. To have had the wash laundered at current power-laundry prices would have cost 4s. 10d.

Equipment for home laundrywork. Equipment, its use and suitability for purpose have been discussed in Chapters VI, VII, VIII, and Table B gives a comparison of suitable equipment for different types of homes.

Approximate prices are given in the Equipment Price List.

Most housewives have to carry out household washing in a kitchen that is used for cooking and general housework as well. This should be well lighted, and easy to ventilate. When washing has to be done as well as other work in a room of this kind, certain points with regard to wall and floor finishes are important because of the steam that is caused. It is advisable to have a non-absorbent floor; many types of cement floors are good in this respect. The floor can be covered with a thick matting at times when laundrywork is not in progress. Tiled



Arrangement of Apparatus for Home Laundrywork

walls, or walls tiled half-way with washable paint above the tiles, are recommended. A white washable paint ceiling is very easy to keep clean and in good condition.

The placing of equipment will depend upon the available space. The following points should be remembered:

1. The equipment must be of suitable size and efficient in action for its particular work.

2. All equipment should economize time and energy in use and cleaning.

3. Each piece of equipment should save space in storage; the merits of equipment that will serve more than one purpose should be considered.

4. It should be possible to group equipment together so that the clothes can pass from one operation to the next without unnecessary lifting or walking.

The plan on page 147 shows the arrangement of apparatus necessary for laundrywork in a small modern house, where the housewife prefers to have most of the washing done at home. The apparatus is chosen and grouped so that the best utilization is made of the space available, and all operations can be carried out in sequence with the minimum of effort.

Institutional laundry. An institutional laundry should be planned so that the clothes go from Receiving and Sorting, through all the laundry processes to Dispatch without having to retrace the ground covered at any point. Sorting and Dispatch are usually done in separate rooms. All other processes are carried out in one room with the apparatus for each process grouped together.

The information given about floor, wall, and ceiling finishes for the home laundry-room apply equally to the institutional laundry. In addition it is most essential that the floor of this laundry should be well drained. There should be adequate draining channels beneath all washing machines and hydro-extractors. There should be good light, and very good ventilation. As little wood as possible is recommended, and any that is necessary should have a finish that can be easily cleaned. Machines of the same type and size as far as possible make repair work easier. All machines should be fitted with safety devices, and have guards, so that the risk of danger to the worker is minimized.

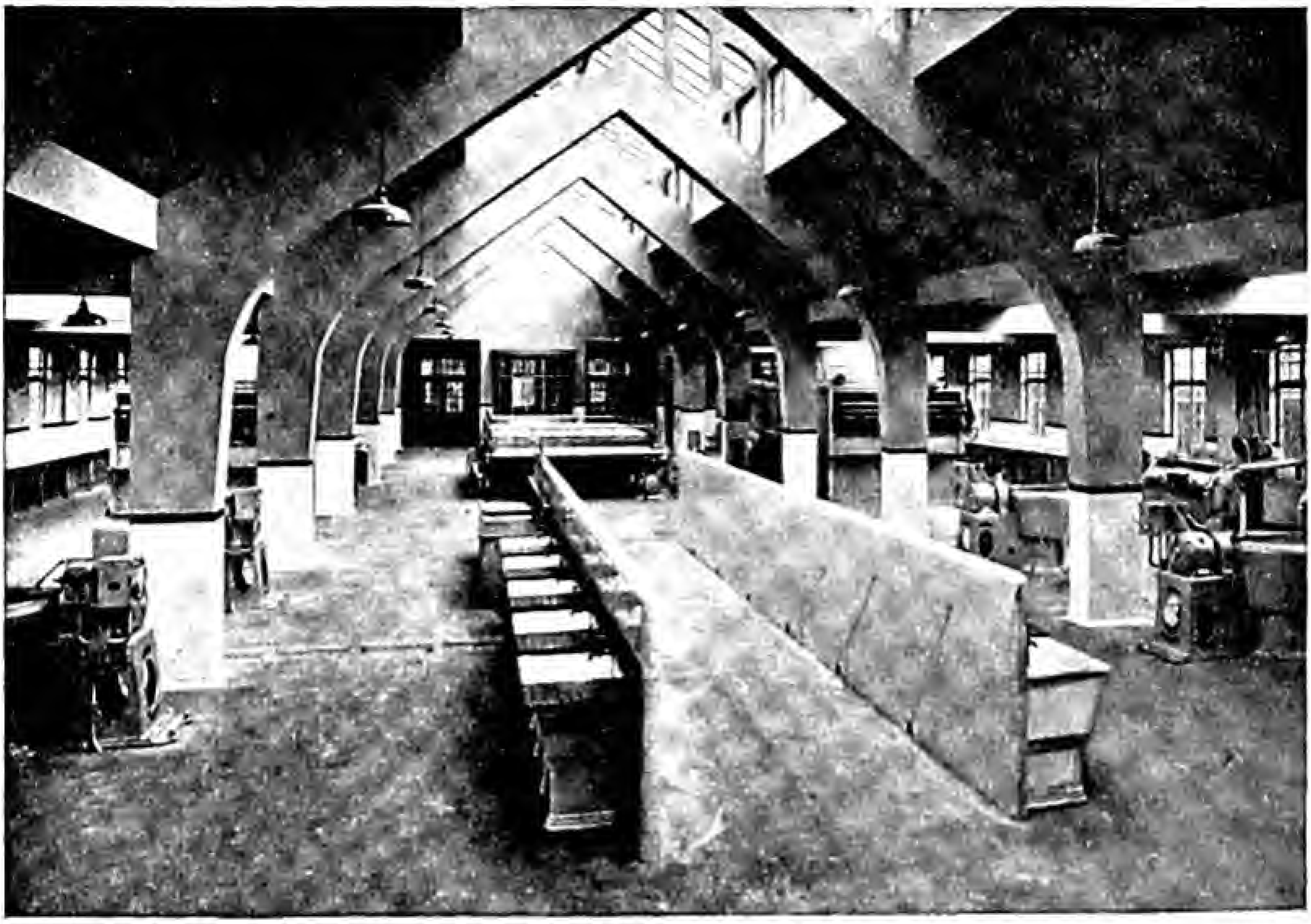
Receiving and sorting. The sorting room should be equipped with a

low table, on which the sorting can be done, and several wagons into which the clothes are placed as they are sorted. These are wheeled direct to the washers. This is a more economical plan than sorting into bins and having to move the clothes again.

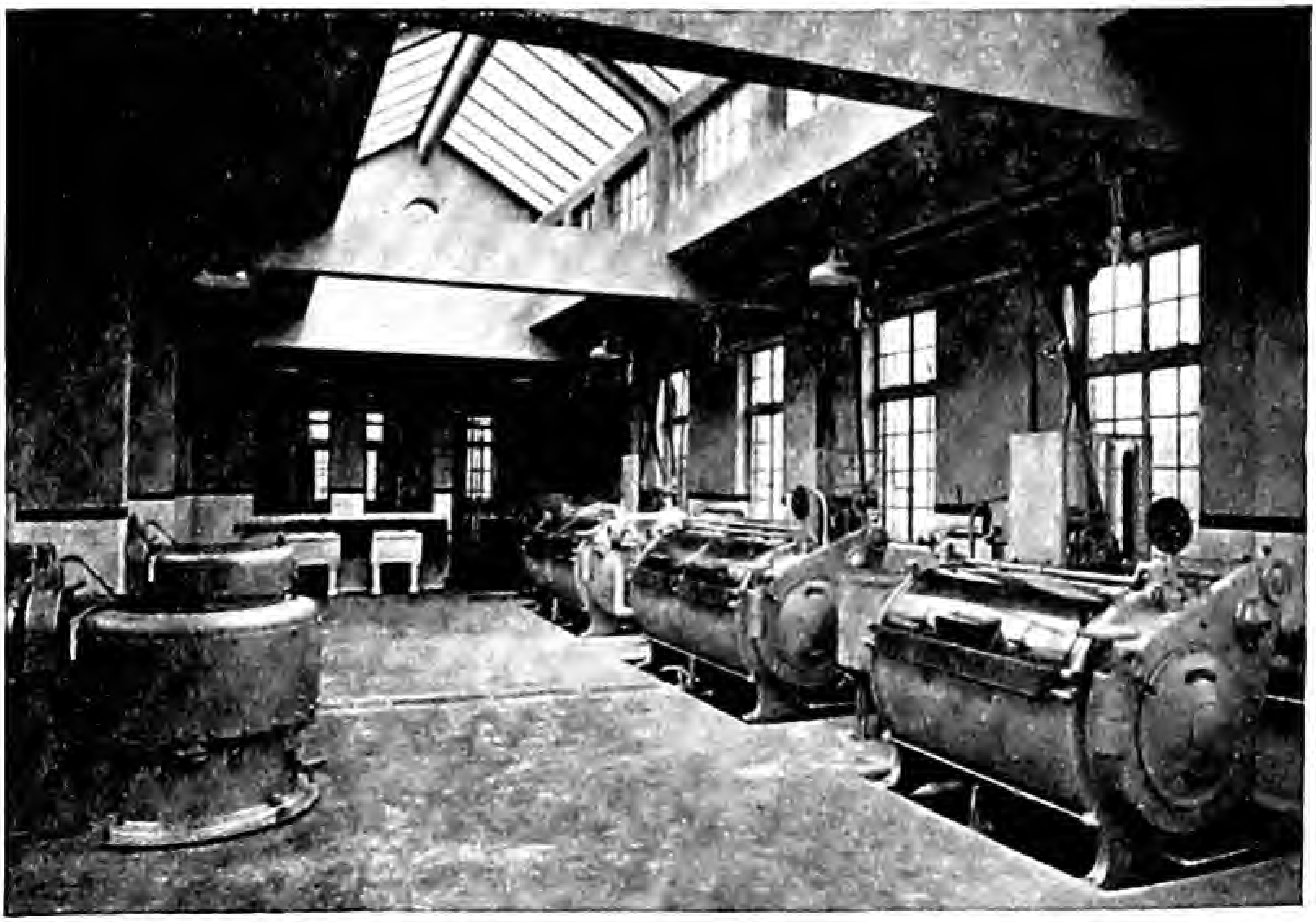
Cleansing and finishing. The wagons are unloaded directly into the washing machines. These are rotary machines, in which the whole of the cleansing is carried out. Their action can be suited to all fabrics. They are made of smooth, highly polished metal, such as brass or monel. The inner perforated cylinder, into which the clothes are placed, has a very smooth finish. The perforations allow of the free passage of the water through the clothes as the cylinder rotates. These machines can be geared, so that after completing a certain number of revolutions the cylinder can remain at rest for a longer or shorter period according to the requirement of the fabric being washed. This makes the machine suitable for all types of fabrics. The alternative is to have a separate machine for woollens, that cleanses by suction, or kneading and squeezing. All machines are filled with water for the different processes, and emptied by movement of levers. The clothes are put into the machine, and go through the whole of the cleansing process before being removed. This is accomplished by regulating the heat of water, and the amount and type of detergent to each process. Thus the bleached clothes are subjected to a ' breakdown ' in a low-temperature water for a short time. This replaces steeping. They are next subjected to successively hotter waters with the addition of detergent for the cleansing. These are followed by several rinsings, the temperature of the water decreasing with each successive rinse. Blueing and starching can be done in these machines when necessary.

Hydro-extractors are used for removing moisture from the clothes when they are taken from the washing machines. These can be individual units operated from their own motor, and should be placed near the washing machines. Clothes are packed into the inner cage, the lid closed, the machine started, and allowed to run for the time required according to the state of dryness necessary for finishing. Clothes are packed into wagons and are taken to the finishing apparatus.

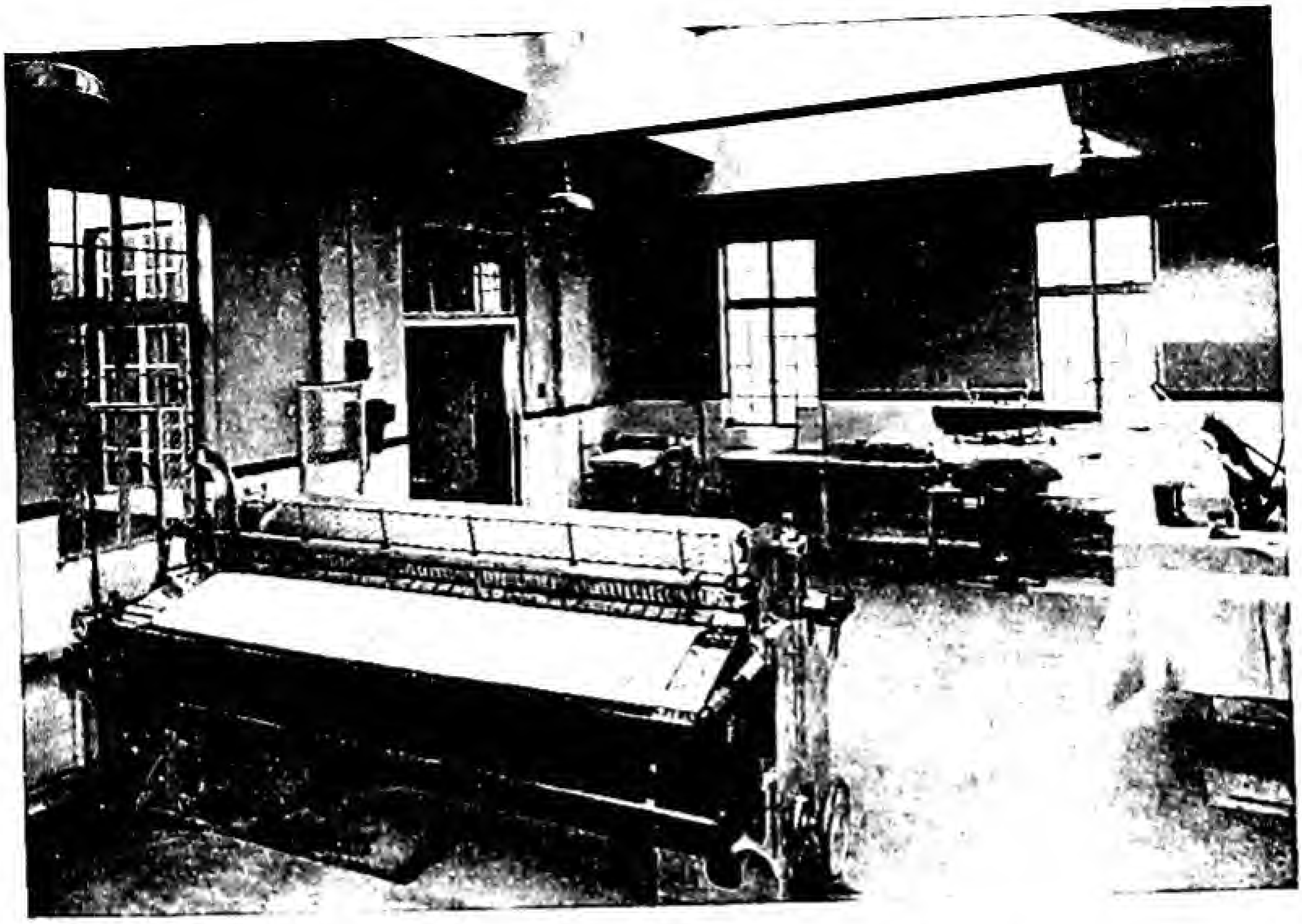
Some washing sinks may be necessary for the washing of special articles. These should be porcelain finished, so that they are easy to keep clean, and do not damage clothes. Each sink should be supplied with hot and cold water, and have an overflow. There should be a



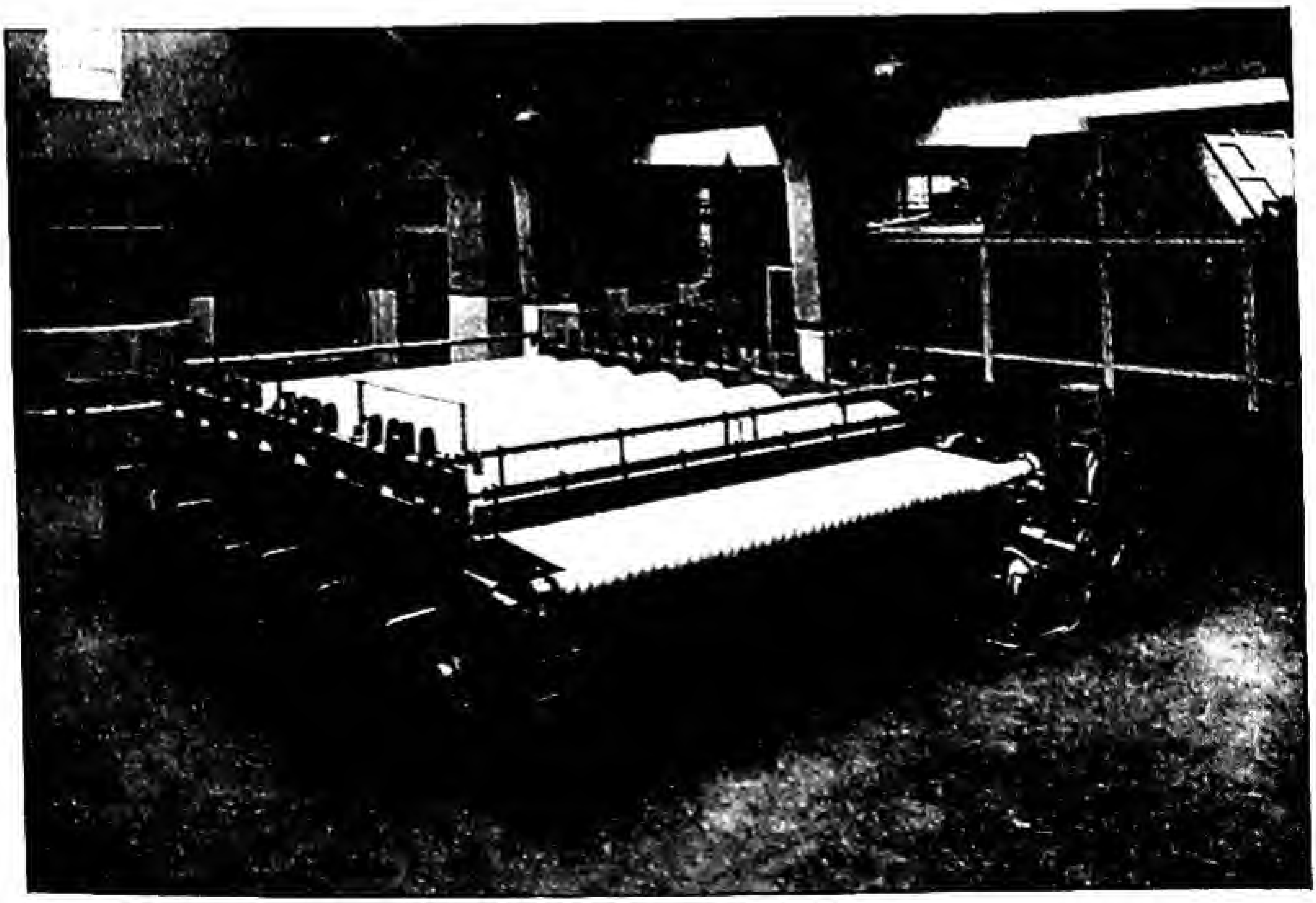
Institutional Laundry. General View



Institutional Laundry Washing Machines and Hydro-extractor



INSTITUTIONAL LAUNDRY. Placing of Apparatus



INSTITUTIONAL LAUNDRY. Multi-roll Ironer and Drying Cabinet

wooden draining board between each sink, and a rubber wringer to each group of four sinks.

A drying chamber of some kind is necessary; it is not practicable to depend upon outdoor drying, where large quantities of clothes have to be treated. There are drying tumblers which work on the same principle as the rotary washers, the clothes being rotated in heated air in a perforated cylinder. Drying cabinets are a very usual type; they allow of a large number of articles being dried, and are suitable for all fabrics. One type has stands on which to hang the clothes, these stands being placed back into the heated air of the chamber after filling. The air is kept moving and at a constant temperature that will dry any fabric without damage. Another type of continuous drying chamber has rails on to which the clothes are clipped; these rails are turned into the heated chamber, and the clothes gradually passed through to be removed dry at the other end.

Finishing machines may consist of a multi-roll ironer, which may have up to eight rollers, and is used for finishing all kinds of flat, unstarched work; a decoudun for finishing starched work; steam presses for finishing garments; strong skirt boards with an electric iron fitment to each.

Dispatch. This room should have sufficient table accommodation to sort the finished work, and rack accommodation to leave it airing a short time before being packed into baskets and returned.

Checking. The amount of checking on Receiving and rechecking on Dispatch that is necessary in this type of laundry will depend upon the type of work undertaken, and the number of people whom the laundry serves. It may be possible to arrange so that all work of one type is sent together. This will minimize checking and rechecking, and will make the cleansing of each delivery of clothes easier, because the same procedure will be required throughout for the whole load. Where this is not possible, and mixed loads of clothing must be taken, the checking on Receiving in the sorting room must be exact, then checking on Dispatch will be a simple routine.

CHAPTER XVIII

EXPERIMENTS ON WATER, OTHER LAUNDRY REAGENTS, AND FABRICS

THE following experimental work suitable for carrying out on fabrics and laundry reagents is included in order to provide a definite basis for the better understanding of practical laundrywork. It emphasizes the underlying principles of laundry processes, and the work can be adapted to suit various requirements and conditions.

Laboratory apparatus is suggested, but in most cases substitutes may be found in the domestic science equipment.

Water: Preliminary tests.

Apparatus. Bowls, conical flasks. Tap water, rain water, softened water, soap, litmus paper.

1. Fill bowls with each kind of water, and feel the water.

2. Wash the hands with soap in each water in turn. Note the amount of lather produced in each case, and the appearance of the water.

3. Half fill flasks with the waters. Shake each, and notice any difference in sound.

4. Test each of the waters with red and blue litmus paper.

To find the total hardness of water.

Apparatus. Burette, flasks of equal size, measuring cylinder, filter funnel, and filter paper.

Clark's standard soap solution, distilled water, tap water.

1. Put 70 cubic centimetres of tap water into a flask.

2. Fill the burette with soap solution. Read the level of the soap solution in the burette, and enter in notebook.

3. Add soap solution drop by drop to the water, shaking after each addition until a lather is formed which remains for three minutes.

4. Read the level of the soap solution and enter it. Subtract the first reading from the second to find the number of cubic centimetres of soap solution used. Repeat the experiment to get an accurate result.

One cubic centimetre of soap solution is required to make a lather with pure water, so this has to be subtracted from the total used.

Example:

First reading of burette	Second reading	Soap used
1 cc.	22 cc.	21 cc.

One *degree of hardness* $\equiv$ 1 grain of chalk in 1 gallon of water;
1 gallon of water weighs 70,000 grains;

$\therefore$ 1° of hardness $\equiv$ 1 part of chalk in 70,000 parts of water.

Since 70 cc. of water weigh 70,000 milligrams, and 1 cc. of standard soap solution contains soap to destroy 1 milligram of chalk,

$\therefore$ one cubic centimetre of soap solution is used for each degree of hardness of the water.

Thus in the example the hardness of the water is $21-1=20$ *degrees of hardness*

Repeat, using other samples of water, and compare the total hardness.

To find the permanent hardness of water.

Boil the water and remove the carbonates that cause the temporary hardness, proceeding as follows:

1. Boil 250 cc. of tap water in a flask for 15 minutes.
2. Filter to remove the precipitate.
3. Cool and make up the water lost by evaporation, using distilled water.
4. Measure out 70 cc. of this water into a conical flask.
5. Add soap solution until a lather is formed which lasts for 3 minutes.
6. The number of cc. of soap solution used minus 1 cc. gives the number of degrees of permanent hardness present in the water.

Example:

Soap solution used $=12$ cc.

$\therefore$ the amount of permanent hardness $=12-1=11°$.

To find the temporary hardness of the water.

Deduct the permanent hardness from the total hardness.

To soften hard water.

Apparatus. Burette, conical flasks, measuring-cylinder. Sodium

carbonate solution, 1 per cent. Borax solution, 1 per cent. Ammonia, 1 per cent. Tap water, standard soap solution.

1. Measure 70 cc. of tap water into each of three flasks (*a*), (*b*), and (*c*).
2. To (*a*) add 5 cc. of 1 per cent sodium carbonate solution.
3. To (*b*) add 5 cc. of 1 per cent borax solution.
4. To (*c*) add 5 cc. of 1 per cent ammonia solution.
5. Mix well and then add soap solution to each until a permanent lather is obtained.
6. Compare the effect of the solution added in each case.

To find the best method of removing non-greasy dirt from cotton material.

To show the effect of steeping:

Apparatus. Bowls of similar size. Five evenly soiled non-greasy pieces of white cotton material of equal size.

1. Keep as a control.
2. Steep in cold water for 1 hour.
3. Steep in hot water for 1 hour.
4. Steep in cold water with 1 tablespoonful of soda to a gallon.
5. Steep in cold water with 1 oz. of dissolved soap to a gallon.

Use the same quantity of water in each case.

Leave all the pieces in the water for the same length of time.

Examine the materials after steeping and compare.

Examine the steeping water and notice whether the dirt particles are in suspension. Compare the amount of dirt extracted.

To show the effect of friction washing:

Apparatus. Six evenly soiled non-greasy pieces of material about 6 in. square. Bowls. Soap.

Use the same quantity of water in each case.

1. Keep as a control.
2. Wash by hand friction in cold water.
3. Wash by hand friction in hot water.
4. Wash by hand friction in cold water and soap.

5 and 6. Wash by rubbing friction in hot water and soap.

Rinse (6) in hot water, put into softened soapy water when nearly boiling. Boil for 15 minutes.

Examine all the pieces, and conclude from the results the best method of removing non-greasy dirt from white cotton.

To find the best method of removing greasy dirt from white cotton material.

Apparatus. Evenly soiled greasy cotton material in equal sized pieces. Bowls. Soap.

Repeat last experiment, using the greasy dirty material. Conclude as to the best method of cleansing.

To find whether the quantity of dirt and type of material affects the amount of soap used.

Apparatus. Four conical flasks, burette, soot, cotton, wool, water, weak soap solution.

Fill the burette with the soap solution. Put 100 cc. of softened water into each of four flasks.

Keep flask (1) with water only.

Into flask (2) place half a teaspoonful of soot.

Into flask (3) place a piece of wool 2 in. square.

Into flask (4) place a piece of cotton 2 in. square.

Add soap solution gradually from the burette first into the flask containing the water alone until a permanent lather has been obtained.

Repeat with the other three flasks.

Compare the amount of soap solution required and conclude as to its bearing on laundrywork.

To compare the wetting power of water and soapy water.

Apparatus. Evaporating dishes. Four pieces of white woollen material 4 in. square. Coloured soapy water.

1 & 2. Place one piece in each of two dishes. Drop coloured water on to one piece and coloured soapy water on to the other piece.

Note on which material the liquid is absorbed first.

3 & 4. Fill one dish with cold water and another with soap solution.

Place one piece on the top of each liquid.

Observe which piece sinks first.

Conclude whether water or soapy water wets the fabric most rapidly.

To show the effect of alkalis and soap on grease.

Apparatus. Test-tubes, water, lard, 1 per cent solutions of soap, soda, borax, ammonia.

Put 1 in. of water into a test-tube.

Put 1 in. of each of the other solutions into test-tubes.

Add to each a piece of lard the size of a small pea.

Shake each and leave to stand for ½ hour.

Note whether an emulsion has been formed. Explain what has happened to the grease in each case, and conclude as to which solutions will help to remove grease from fabrics.

To show the action of soap and paraffin on grease.

Apparatus. Three test-tubes, paraffin oil, soap solution, water, lard.

Place 1 in. of water into a test-tube, and 1 in. of soap solution into each of the other two. Add two drops of paraffin oil to the first two tubes and a piece of lard as big as a small pea to all three. Shake well and allow each to stand ½ hour. Notice the effect on the lard in each case.

Conclude as to the value of a paraffin wash for greasy articles.

To show the action of a grease solvent on a grease spot.

Liquids of high surface tension tend to draw away from those of lower surface tension. Water has a higher surface tension than alcohol.

1. Place a little water coloured with methylene blue in a large evaporating dish.
2. Place a drop of alcohol or methylated spirit in the centre of the water.

Does the water draw away from the alcohol?

To find the best method of removing a grease spot from non-washing material.

Grease has a high surface tension. A grease solvent has a lower surface tension.

Apparatus. Pieces of material each with a grease spot. Benzene or other grease solvent, french chalk, iron, blotting paper.

1. Treat grease spot by applying grease solvent to the centre of the grease spot.
2. Place the grease spot over a pad of material, and apply the grease solvent to the outside of the grease spot and work inwards.
3. To a fresh grease spot apply french chalk. Leave for ½ hour and shake off the chalk.
4. Place clean blotting paper above and below the grease spot and hold a moderately hot iron over.

Compare the results and conclude as to how grease may be removed from fabrics without washing.

To find the best method of removing stains from white cotton material.

Apparatus. Eight pieces of cotton material for each of the following stains: iron rust, fresh ink, dry ink, fresh fruit, dry fruit, fresh tea, dry tea, fresh meat stain, dye stain.

Steep each stain in the following solutions for 5 minutes.

1. Cold water.
2. Boiling water (pour through stain).
3. Borax solution, 1 oz. to 1 pint of water.
4. Sodium perborate, 1 oz. to 1 pint of water.
5. Oxalic acid, 1 oz. to 1 pint of water.
6. Javelle water used with an equal quantity of hot water.
7. Hydrogen peroxide diluted 1 : 6 with cold water.

Rinse each piece in cold water.

Pin on to a cloth in order and dry.

Compare the results with the untreated stains.

What is the best method of removing the above stains?

Additional experiments on stains.

Fresh ink stain:

(*a*) Steep in milk and leave until the milk is sour. Wash well.

(*b*) Spread tomato juice on to the ink stain and leave for ½ hour. Wash out.

Dry ink stains:

(*a*) Prepare a solution of oxalic acid, 1 oz. to 1 pint of hot water; (*b*) and of borax, 1 oz. to 1 pint of hot water.

Dip the ink stain first into (*a*), and squeeze out. Then place in (*b*) and squeeze out. Repeat until the stain has been removed. Rinse well.

What is the special value of this method?

To find the correct method of making starch solution.

Apparatus. Microscope, slides, coverslips, basins, laundry starch, maize, rice, potato, and wheat starch.

1. Place a lump of dry starch in a basin. Pour boiling water over it. Examine the outside and inside of the lump.

2. Mix 1 teaspoonful of starch with cold water to form a paste. Leave to stand for ½ hour.

3. Mix 1 teaspoonful of starch with cold water to form a paste. Add hot water and leave to stand for ½ hour.

4. Mix 1 teaspoonful of starch with cold water to form a paste. Add boiling water and leave for ½ hour.

Note the results and save some of (4) to examine under the microscope.

To find the temperature at which starch thickens.

Mix 1 teaspoonful of starch to a paste, and add 1 gill of cold water. Heat the mixture and notice the temperature at which the starch thickens most.

Conclude why it is necessary to have the water really boiling when making starch solution for laundrywork.

Microscopic appearance of starch.

1. Add a few drops of straw-coloured iodine to raw starch and to the thickened starch solution.

2. Mount a few grains of laundry starch on a slide, add a drop of dilute iodine, cover with a coverslip, and examine under the low and high power objectives. Make slides of rice, potato, wheat, and maize starches and of the thickened starch solution.

Identify the grains present in laundry starch, and notice the effect of the boiling water on the starch grains.

Laundry blues.

Apparatus. Ultramarine, methylene, and Prussian blues. Cylinders, test-tubes, caustic soda, acetic acid.

1. Make up dilute mixtures of each blue with water. Compare the colours.

2. Dip pieces of white cotton material in each blue, and examine the colour produced.

3. Put an inch of blue solution into a test-tube, and add a little acetic acid or vinegar.

Repeat with each blue and notice the effect.

4. Put an inch of Prussian blue solution into a test-tube and add a little caustic soda solution and heat.

Note the effect on the blue and the slight precipitate formed. A similar result would be obtained in fabrics that contained alkali left after washing.

The properties of fabrics.

Apparatus. Equal-sized pieces of cotton, linen, wool, silk, viscose

rayon, cellulose acetate rayon, and knitted cotton for each test and pieces for controls. Microscope, slides.

Apply the following tests to the fabrics and tabulate the results.

1. Untwist a thread and mount fibres from each fabric, and examine under the low- and high-power objectives. Draw the fibres.

2. Examine the surface of each fabric and the weave.

3. Note the feel of each fabric.

4. Place a drop of water on each fabric, and note the rate of absorption in each case.

5. Fill evaporating dishes with water. Place one piece of material on each, and notice which sinks first.

6. Squeeze out the moisture from each, and notice which feels wettest.

7. Stretch each piece of wet material warp way and weft way, and compare with dry pieces also stretched.

8. Burn a small piece of each fabric in turn. Note the rate of burning, the smell, and the type of ash.

To find the reaction of fabrics to laundry processes.

Apparatus. Equal-sized pieces of cotton, wool, silk, linen, viscose rayon, and cellulose acetate rayon for each test, and one of each for controls.

1. Steep a piece of each fabric in cold water for 24 hours.

2. Wash a piece of each material in hot water by friction washing, using hard soap. Rinse in hot water.

3. Wash a piece of each material in warm water by kneading and squeezing, using soap solution to make a lather. Rinse in warm water.

4. Put a piece of material into softened soapy water just before it boils, and boil for 15 minutes. Rinse in hot water.

5. Try the effect on dry pieces of material of:

   (*a*) A moderately hot iron.

   (*b*) A hot iron.

6. Try the effect on damp pieces of materials of:

   (*a*) A moderately hot iron.

   (*b*) A hot iron.

Pin the pieces in order on to a cloth, dry, and paste into book. Compare the results of these tests with the control pieces of material and conclude which treatment is most suitable for each fabric.

To find the effect of laundry reagents on fabrics.

Apparatus. Equal-sized pieces of cotton, linen, wool, silk, viscose rayon, cellulose acetate rayon, for each test and one piece of each for controls.

Steep one piece of each fabric in the following hot solutions for 5 minutes.

1. Soda solution, 1 oz. to 1 pint.
2. Borax solution, 1 oz. to 1 pint.
3. Sodium perborate, 1 oz. to 1 pint.
4. Hydrogen peroxide, 1 to 6 dilution.
5. Javelle water diluted with equal quantity of hot water.
6. Acetic acid diluted 1 to 4.
7. Oxalic acid, 1 oz. to 1 pint.

Pin on to a cloth, dry, mount in book, and compare the results. Conclude as to which reagents may be used with safety on each fabric.

To find the best method of treating coloured fabrics.

Apparatus. Pieces of coloured fabrics.

1. Steep in cold water for 24 hours.

2. Wash in hot water, using hand friction and hard soap. Rinse in hot water.

3. Wash by kneading and squeezing in soapy water. Rinse in warm water, then in cold water, with 1 teaspoonful of vinegar to 1 quart of water.

4. Treat dry material with: (*a*) a moderately hot iron; (*b*) a hot iron. Repeat, using damp material.

Fireproofing of inflammable fabrics.

Apparatus: Pieces of muslin and flannelette. Solution of borax and boric acid.

Proportion: 2½ ozs. borax and 1 oz. boric acid dissolved in 1 gill of water at 112°F.

Immerse pieces of muslin and flannelette in the solution at 40°C for 15 minutes.

Dry.

Compare the rate of burning with that of untreated fabric. See page (84, Flannelette.)

EQUIPMENT PRICE LIST

(Approximate prices of typical laundry apparatus, January 1934)

		£	s.	d.
Boiler stick	from			9
Boiler fork	,,		2	3
Boiler tongs	,,		1	0
Bench with two baths	,,	1	5	0
Clothes horses—2-fold	,,		1	8
Clothes basket—16 in.	,,		1	9
Clothes cord—12 yd.	,,			4
Clothes pegs—per gross	,,		2	0
Clothes prop	,,			10
Clothes line post with socket	,,		7	6
Ceiling drier—3 6-ft. rods	,,		4	6
Collapsible drier, large size	,,		10	6
Dolly tub, wood—16 in. by 20 in.	,,		11	3
zinc—18 in. by 20 in.	,,		8	0
Dolly peg	,,		2	6
Drying cabinet, gas heated	,,	14	3	6
electrically heated	,,	54	0	0
Dry-cleaning apparatus	,,	3	4	0
Extending clothes line	,,		3	0
Irons, Flat—per lb.	,,			4½
Polishing No. 2	,,		2	6
Goffering	,,			10
Charcoal	,,		11	3
Methylated spirit	,,		17	6
Petrol	,,	1	16	0
Gas	,,		8	0
Electric	,,		10	6
Iron heaters: Coke heaters—12 irons	,,	3	10	0
Gas heaters—20 irons	,,	10	10	0
Electrically heated	,,	19	10	0

		£	s.	d.
Iron stands, metal—each	from			9
Ironing felt, 36 in. wide—per yd.	,,		3	6
Ironing sheeting 70 in. wide—per yd.	,,		1	11½
Ironing blanket, flannelette—each	,,		2	11½
Linen baskets	,,		9	0
Linen bins	,,		10	6
Mangle convertible to table	,,	4	4	0
Papier mâché bowls	,,		4	0
Radial clothes drier	,,		1	6
Rubbing board, wood	,,		1	3
zinc	,,		2	0
Suction washer—6 in. copper	,,		2	9
8 in. zinc	,,		1	11
Skirt board, collapsible	,,		5	6
Sleeve board, wood			2	9
metal	,,		16	0
Unit ironing table	,,	2	5	0
Velvet pressing board—30 in. by 5 in.	,,		15	0
Washing machine: Hand operated	,,	1	15	6
Convertible for boiling	,,	6	5	0
Electrically driven	,,	16	16	0
Wash boiler: Small zinc	,,		4	6
Gas heated—10 gallon	,,	2	15	0
Electrically heated—10 gallon	,,	5	5	0
Wringer, rubber rollers, convertible to table	,,	3	3	0
Wringer stand, folding	,,		3	11
Zinc baths—20 in.	,,		1	8

STORES PRICE LIST

(Approximate prices of the more usual laundry stores, January 1934)

Soap.

Soap containing an appreciable percentage of olive oil and suitable for laundrywork	bar of 15 oz.	5d.
Special soaps	bar of 8 oz.	6d. to 7½d.

Soap flakes.

Packet flakes	9 oz.	6d.
Loose flakes. Laundrywork quality . .	1 lb.	7d.

Soap powders.

Suitable for laundrywork . .	packet	3½d., 6d., 10d.

Liquid cleaning agents.

Acetic acid	1 pint	1s.
Ammonia	,,	1s. 4d.
Aviation petrol	1 gallon	2s.
Benzine	8-oz. bottle	1s. 4½d.
Carbon tetrachloride	8-oz. bottle	9d.
Commercial dry-cleaning solvent . .	1 gallon	10s.
Hydrogen peroxide, 20 vols.	1 pint	1s.
Paraffin	1 gallon	1s.
Turpentine	1 pint	9d.

Dry stores.

Blue	1 cube	1d.
Borax	1 lb.	4d.
Bran	,,	2d.
Carbonate of magnesia	1 oz. 1½d. or 1 lb.	1s. 2d.
Chloride of lime	packet of ½ lb.	6d.
French chalk	1 lb.	5d.
Glue	,,	9d.

Dry stores—*continued*

Gum arabic	1 lb.	2s. 4d.
Oxalic acid	,,	1s. 2d.
Quillaia bark	,,	1s. 9d.
Sal ammoniac	,,	8d.
Salts of lemon	,,	1s. 9d.
Sodium perborate	,,	3s. 4d.
Starch (rice)	,,	5d.
Washing soda	1 lb. 1d. or 7 lb.	6d.

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